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Select Committee on Research Issues STI Report for Congress

142 Top Managers Study R&D Problems

Two reports of keen interest to top-level management of research and development were distributed at a Dec. 7-8 symposium on "The Environment of the Federal Laboratory," which attracted 142 officials of all Federal agencies engaged in R&D.

The symposium was the third annual meeting sponsored jointly by the United States Civil Service Commission (CSC) and the Federal Council for Science and Technology (FCST) to consider problems related to R&D and scientific personnel. The reports to be reviewed in this article, following a summation of highlights of the symposium, are:

• "Federal Workforce Outlook Fiscal Years 1965-1968," dated November 1964 and prepared by the CSC, the first of a series to be issued annually as a "planning aid to Federal Administrators and Personnel Specialists, and as a service to Educacational Institutions."

• "Personnel Management for Scientists and Engineers: Status, Critical Issues and Commission Leadership," a staff paper prepared by the Bureau of Programs and Standards, CSC.

Until distributed at the symposium, the latter report had been confined

(Continued on page 4)

Featured in This Issue . . .

ASAP Member Selected For Medal of Science

Dr. Charles Stark Draper, head of the Department of Aeronautical Engineering, Massachusetts Institute of Technology (MIT) and a member of the Army Scientific Advisory Panel (ASAP), has been selected to receive the 1964 Medal of Science.

President Johnson recently announced the selection of Dr. Draper, along with 10 other scientists who will receive the award for their "outstanding contributions to scientific

(Continued on page 2)

Dr. C. S. Draper

Comprehensive Study Covers Problems of Documentation, Disseminating R&D Results

When the Eighty-Ninth Congress convenes this month, one of the priority reports it will consider is *Documentation and Dissemination of Research and Development Results*, potentially of profound importance in Federal Government efforts to improve utilization of scientific and technical information.

Prepared by the House Select Committee on Government Research, chaired by Rep. Carl Elliott, the 148-page report is the fourth in a series on 10 comprehensive studies being made by the Committee on Federal research and development programs and problems. The report is dated Nov. 20, 1964.

The preceding three reports examined administration of research grants, manpower for research and development, and Federal real property used in Federal Science and Technology.

Eight recommendations in the latest report are headed by a proposal for coordinated effort in attacking scientific and technical information problems with a concentration of responsibility and authority. Suggested for this over-all exercise of power is the Committee on Scientific and Technical Information (COSATI) of the Federal Council for Science and Technology.

COSATI, to function effectively, would have to be provided with "teeth to enforce such cooperation," the report notes. It adds: "A pos-

(Continued on page 3)

ARO-D Reports on FY 1964 Research Achievements

The U.S. Army Research Office-Durham (ARO-D), Durham, N.C., recently compiled a brief report of major scientific accomplishments in basic research supported by the Army through ARO-D during FY 1964.

Projects in the report represent a selection rather than a complete record of accomplishments in the ARO-D program. No attempt was made to restrict the report to results which will lead immediately to military applications.

In a normal year the ARO-D program yields somewhat over 500 articles that are published in the standard scientific journals. While these

(Continued on page 6)

Army R&D Newsmagazine

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Purpose: To improve informal communication among all segments of the Army scientific community and other Government R&D agencies; to further understanding of Army R&D progress, problem areas and program planning; to stimulate more closely integrated and coordinated effort among the widely dispersed and diffused Army R&D activities; to maintain a closer link from top management through all levels to scientists, engineers and technicians at the bench level; to express views of leaders, as pertinent to their responsibilities, and to keep personnel informed on matters germane to their welfare and pride of service.

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Submission of Material: All articles submitted for publication must be channeled through the technical liaison or public information officer at installation or command level.

By-lined Articles: Accuracy and relevancy of contents of this publication to accomplishment of the Army R&D mission are of constant concern to the editors. Primary responsibility for opinions of by-lined authors rests with them; their views do not necessarily reflect the official policy or position of the Department of the Army.

DISTRIBUTION is made automatically each month based on requirements stated on DA Form 12-4, permitting changes as necessary.

Distribution requirements for the Office of the Secretary of the Army, Under Secretary of the Army, Assistant Secretary of the Army (R&D), Chief of Staff, Chief of Research and Development, and Chief of Information will be submitted by the Office of the Chief of Research and Development.

All other Department of the Army agencies should submit their requirements through channels to the Army Publications Distribution Center servicing them.

Changes in requirements of other Government agencies should be submitted directly to the Army Research Office, OCRD, Department of the Army, Washington 25, D.C., ATTN: Scientific and Technical Information Division.

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ASAP Member Selected for 1964 Medal of Science

(Continued from page 1)

knowledge" at White House ceremonies early this year.

Established by Congress and first awarded in 1962 to Theodore Von Karmen, the medal will be presented to Dr. Draper for his "innumerable imaginative engineering achievements" in aeronautics and astronautics. Five scientists received the award in 1963.

Dr. Draper, who has been associated continuously with the MIT since 1922, was appointed to the ASAP in September 1956 and has served until the present time.

He has three degrees from MIT—B.S. in electrochemical engineering (1926), M.S. in physics (1928), and Sc.D. in physics (1938). In 1917 he attended the University of Missouri and in 1922 received a B.A. degree in psychology from Stanford University.

For more than 25 years, he has made notable contributions in teaching and research at the Institute, and is responsible for an extended curriculum of courses in instrument engineering and weaponry fire control, including classified work leading to degrees for Navy and Air Force officers in armament and fire control.

Dr. Draper has served in the fields of aeronautical power plants, flight testing, vibration measurements, and control engineering, with special attention to applications of gyroscopic principles for military and commercial equipment.

During the past 15 years, his research efforts have been concerned principally with antiaircraft fire control for the U.S. Navy and airborne fire control equipment for the Air Force, resulting in equipment now in wide use.

He has served as consulting engineer to many aeronautical companies and instrument manufacturers, holds a number of patents for measuring and control equipment, and has written extensively in the fields of instrumentation and control.

A registered professional engineer in Massachusetts, he is a Fellow and member of various professional societies, fraternities and associations and has received numerous awards.

In 1946 he received the Medal for Merit, the Naval Ordnance Development Award for his work in antiaircraft fire control, and the Sylvanus Albert Reed Award of the Institute of the Aeronautical Sciences for "application of the gyroscope to computing devices for gunnery and to other computing devices."

The Engineering Societies of New England presented him with the New England Award in 1947 for outstanding engineering contributions. In 1951 he received the Exceptional Civilian Service Award from the Department of the Air Force.

The same year, the Industrial Instruments and Regulators Division of the American Society of Mechanical Engineers presented a Testimonial of Appreciation to Dr. Draper In 1955 he presented the 43rd Wilbur Wright Memorial Lecture before the Royal Aeronautical Society in London, England.

The Navy Distinguished Public Service Award in 1956 recognized him for "development of a long-range submerged navigation system." In 1957 he received the National Airpower Award from the Air Force Association (AFA), the Airpower Award from the Massachusetts Wing of the AFA, and the Institute of Navigation Thurlow Award.

Other scientists selected to receive the 1964 National Medal of Science include:

Roger Adams, professor emeritus of chemistry, University of Illinois, for contributions to organic chemistry; Othmar Herman Ammann, consulting engineer and designer of the George Washington and Verrazano-Narrows Bridges in New York;

Robert Burns Woodward, professor at Harvard, for "imaginative new approach to the synthesis of complex organic molecules and for brilliant syntheses of strychnine, reserpine, lysergic acid and chlorophyll"; Marston Morse, professor, Institute for Advanced Study, Princeton, for "statesmanship in the world of mathematics";

Harold Clayton Urey, University of California professor, for "outstanding contributions" to the understanding of the origin and evolution of the solar system; Julian Schwinger, Harvard physics professor, for "profound work on the fundamental problems of quantum field theory"; Theodosius Dobzhansky, California Institute of Technology professor and a member of the Rockefeller Institute, for fundamental studies of the genetic determinant of organ evolution; Neal Elgar Miller, professor of psychology at Yale, for "sustained and imaginative research and principles of learning and motivation";

Solomon Lefschetz, professor emeritus of mathematics, Princeton, for "indomitable leadership" in mathematics and for stimulating research in linear control processes; Marshall Warren Nirenberg, head of the laboratory of clinical biochemistry at the National Heart Institute, for "studies of the genetic control of protein synthesis."

Select Committee on Research Issues STI Report for Congress

(Continued from page 1)

sible solution might be for the White House Office of Science and Technology to implement decisions based on COSATI recommendations, the former being closer to the seat of Executive authority."

One of COSATI's first concerns in development of a master plan for coordination of all Federal information facilities, the report points out, should be resolution of the question: "Are there too many?"—prompted by Federal department and agency reports indicating a total of 259 facilities.

Needed is a White House Conference on Scientific and Technical Information, the report contends. The Select Committee on Government Research first submitted this proposal to President Johnson in May 1964, and it was referred to the Office of Science and Technology, headed by Dr. Donald F. Hornig. In discussing the objectives of such a conference, the report states:

"Such a White House Conference should bring together the men and women in Government, in industry, in the universities and in the non-profit organizations who create and use technical information. They will come together to define their problems—which are mutual—and then try to resolve them mutually.

"Such a conference should not, in the words of one of the committee's advisers, 'attempt to solve the technical problems of indexing or equipment design. Let us not even attempt to solve the problem of duplication of effort in spending taxpayer money nor of how to get the various Government information agencies to talk the same language.

"Let us, rather, address ourselves to the larger and more basic question of how we may more effectively and more efficiently marshal our total resources of industry, institutions, and the Government to define our common problems, to set up universal guidelines, to establish interlocking and complementary action programs in both the indexing and the equipment fields which will surely bring to us a better capability of knowing what we have done and of knowing what we are doing in science.

" 'While there is a $15 billion annual problem of this nature in the Federal Government, the real problem is global in nature and might be viewed as such.'

"If such a conference results in a better comprehension of the situation we confront, and distributes among Government, industry, and the other institutions the relevant portions of responsibility, then scientific and technical information and its efficient use will present a less formidable face, and the feeling of 'crisis' will diminish."

Hearings of the Select Committee to gather information presented in the report were conducted between Nov. 18, 1963, and Jan. 22, 1964. Virtually every facet of the over-all problems of scientific and technical information collection and dissemination is analytically reviewed in depth. Activities of all the Federal agencies in developing information programs are concisely presented.

Conclusions of the report liken the scientific and technical information program to the life blood of science, with research in its massive growth producing great quantities of the vital fluid needed to nourish the continuing swell of science.

While noting that the present situation with respect to development of programs to improve utilization of scientific information, because of the rapid proliferation of effort, is one that invites waste and inefficiency, the report observes "there is no certainty yet that there is a great deal of either."

Numerous statistics are cited to indicate the growth in the volume of scientific and technical information being produced each year. The National Federation of Sciences Abstracting and Indexing Services (NFSAIS) reported to the Select Committee the existence in 1963 of 1,855 independent abstracting and indexing service organizations in support of the world's scientific effort, 365 in the United States.

The report states that in 1963 the 22-member organization of NFSAIS alone provided leads to more than a million articles appearing in scientific media throughout the world.

Federal information facilities, in FY 1964, serviced 12 million information requests, one-third from within their own agencies; of the rest, most emanated from other Federal agencies, the balance from contractors and grantees, private concerns and academic institutions.

The Department of Defense accounts for well over 50 percent of the total of 259 scientific and technical information facilities reported to the Select Committee. As of June 1964, the DoD reported 29 information centers and 116 research libraries.

Efforts to progress toward standardization of systems, "software" such as forms, tapes, cards, etc. used in data processing, and the terms and definitions, as well as in adoption of compatible equipment, have met with "resistance to change particularly if change involves surrender of a prerogative," the Committee found.

Discussed also in the report is the highly controversial question of *centralization* versus *decentralization* of information facilities. "The COSATI," it notes, "appears to be committed to

(Continued on page 20)

CHIEF OF R&D Lt Gen William W. Dick and Lt Col E. D. Lowthian, CO, 2199th U.S. Army Reserve R&D Unit, pose with three of the top 15th National Science Fair-International winners who exhibited their projects at the recent Association of the U.S. Army conference in Washington, D.C. Sponsored by the 2100th USAR R&D Unit of Wilmington, Del., the exhibit received many favorable comments and stimulated interest of Army R&D Units in encouraging young scientists as "Tomorrow's Reserve in Research and Development." The student exhibitors are (l. to r.) H. Grady Rylander, III, Paul Stephen Kaplan and Thomas M. McGahee. They were chosen by a panel of Army judges.

142 Top Managers Study Research and Development Problems

(Continued from page 1)

essentially to the consideration of three committees:

- The President's Scientific Advisory Committee (PSAC) panel on Scientific and Technical Manpower for Government Service, under the leadership of Dr. A. G. Hill, professor of physics at Massachusetts Institute of Technology.
- The PSAC Panel on Government Laboratories, chaired by Dr. E. R. Piore, vice president for research, International Business Machines Corp.
- Committee on Scientific Personnel, Federal Council of Science and Technology, headed by Dr. Allan V. Astin, director of the National Bureau of Standards.

Presidential Science Adviser Dr. Donald F. Hornig and CSC Chairman John W. Macy, Jr., headed a long list of dignitaries who attended or participated in the symposium, including directors of laboratories and scientific administrators for the Military Departments and other Federal agencies, as well as Civilian Personnel chiefs.

Dr. Hornig and Mr. Macy, flanked by CS Commissioners L. J. Andolsek and Robert E. Hampton, gave the symposium an auspicious opening with their welcoming addresses.

The initial panel discussion on "Selection and Training of Research Administrators" was moderated by Dr. J. Herbert Holloman, Assistant Secretary of Commerce for Science and Technology. Dr. Chalmers W. Sherwin, Deputy Director of Defense Research and Engineering (Research and Technology), summarized results.

Six panel discussions were held, three each day. Dr. H. J. Goett, director, Goddard Space Flight Center, presided at the session on "Housing and Equipping Federal Research Facilities." Dr. S. Dillon Ripley, secretary, Smithsonian Institution of Washington, D.C., moderated the panel on "Outside Professional Activities" and made the key presentation.

"Use and Significance of Attitude Surveys in Management of R&D" was the subject of a panel discussion and presentation by George Auman, assistant to the director, National Bureau of Standards. Dr. James A. Shannon, director, National Institutes of Health, led off the discussion and moderated the panel on "Personnel Interchange Between Government, Universities and Industry."

Nearly 2½ hours were devoted to discussion of "Inflexibilities in the Federal Service—Inherent or Management Choice," moderated by Dr. Astin. The panel on "Professional Training and Development" was conducted by Deputy Chief and Chief Scientist Dr. F. Joachim Weyl, Office of Naval Research, Washington, D.C.

Major presentations were made by: Edward Glass, special assistant to Dr. Sherwin, who discussed "Findings from Recent Studies in the Department of Defense"; Dr. Marion W. Parker, Director of Crops, Research Division, Plants Industrial Station, Beltsville, Md., "Analysis of Department of Agriculture Research Studies"; Dr. Astin, "Employment Features Important to Scientists and Engineers—Findings from a Recent FCST Committee Survey";

Dr. R. W. Berliner, scientific director, National Heart Institute, National Institutes of Health, Washington, D.C., "Review of NIH Research Management Activities"; George Auman, "Problems Identified by the Committee on Scientific Personnel"; and Dr. O. Glenn Stahl, director, Bureau of Programs and Standards, CSC, "Implementation of Recommendations from a Number of Government Surveys."

The highlight at the dinner session was a debate on "Should There Be a Separate Federal Science Service?" Arguments for such a service were presented by Dr. G. Burroughs Meider, director of National Institutes of Health laboratories and clinics. The negative position was taken by Robert J. Lacklen, director of personnel, National Aeronautics and Space Administration. CS Commissioner Hampton was the moderator.

The Army delegation at the symposium was headed by Deputy and Scientific Director of Army Research Dr. Richard A. Weiss and Dr. Ralph G. H. Siu, chairman of The Army Research Council (TARC) and scientific director, Research Division, Army Materiel Command.

Other Army participants included: Dr. George W. Howard, technical director, U.S. Army Engineer R&D Laboratories, Fort Belvoir, Va.; Dr. Reilley Housewright, technical director, Army Biological Laboratories, Fort Detrick, Md.; Dr. William J. Kroeger, chief scientist, Frankford Arsenal, Philadelphia, Pa.; Leonard H. Erickson, technical director, Feltman Research Laboratories, Picatinny Arsenal, Dover, N.J.;

Billy M. Horton, technical director, Harry Diamond Laboratories, Washington, D.C.; Dr. Curtis W. Lampson, a member of TARC and technical director, Ballistic Research Laboratories, Aberdeen Proving Ground, Md.; John L. McDaniel, technical director, Research and Development Directorate, U.S. Army Missile Command, Redstone Arsenal;

Dr. Dale H. Sieling, scientific director, U.S. Army Natick (Mass.) Laboratories; Dr. Seymour S. Silver, scientific director, Chemical R&D Laboratories, Edgewood Arsenal, Md.; Dr. Robert E. Weigle, technical director, Watervliet Arsenal, Watervliet, N.Y.

Representation from other Federal agencies included: John C. Calhoun, Jr., scientific adviser to the Secretary of the Department of Interior; John D. Young, deputy associate administrator for administration, NASA; Admiral Arnold Karo, director, U.S. Coast and Geodetic Survey; and Dr. William H. Summerson, director, Bureau of Scientific Research, U.S. Food and Drug Administration.

SUMMARIES OF REPORTS. The purpose of the CSC report on "Federal Workforce Fiscal Years 1965-

AMRA Schedules Conference On Experimental Mechanics

The U.S. Army Materials Research Agency (AMRA), Watertown, Mass., will sponsor a conference on theoretical and experimental mechanics in the Boston area Apr. 28-29.

The conference will be limited to U.S. Army personnel, but wider participation is contemplated for future conferences.

In light of considerable interest throughout the Army in behavior of thin shells and in fracture mechanics, these areas will be highlighted as central themes. Papers are anticipated also in related areas such as elasticity, plasticity, viscoelasticity, structural theory, shock vibration and wave motion, soil mechanics and experimental techniques.

For additional information on the agenda and conference arrangements, inquiries may be directed to Richard Shea, Applied Mechanics Research Laboratory, U.S. Army Materials Research Agency, Watertown, Mass. 02172 (Tel: Area Code 617, 926-1900, Ext. 729).

1968," as stated in the introduction and as part of the program of continuing analysis of Federal manpower requirements developed by the CSC Bureau of Programs and Standards, is:

- To gather, analyze, and disseminate comprehensive trend data on current employment levels, turnover experience, and hiring patterns in a broad sample of major Federal occupations.

- To derive projections of these trends which reflect the public program of the President and the Congress, as set forth in the annual Budget document and in Congressional appropriations actions.

- To assess the personnel management significance of these projections for the light they shed on the manpower conditions and problems which lie ahead and on the policy actions which will be necessary to solve them.

Emphasized at the outset is that the report "does not presume to serve all these purposes fully; greater perfection of data will be necessary before this can be claimed."

Data presented in the report cover 160 Federal white-collar occupations, representing about 80 percent of the total Federal white-collar employment. Each of the listed occupations embraces 1,000 or more workers, and the total includes occupations from Federal agencies which are outside the coverage of the competitive service and the Classification Act—the Foreign Service, the Tennessee Valley Authority, and the Department of Medicine and Surgery of the Veterans Administration.

During the period from 1953 to 1963, the report notes, "government" has accounted for fully 41 percent of the total employment increase in the U.S. economy. However, the jump in State and local government employment accounted for 98.1 percent of the overall increase—a gain of 2,837,000 employees as compared to a Federal increase of 53,000 employees.

Predicated upon an anticipated population growth of 6.1 percent during the 1964-68 period (Census Bureau estimate), the increase in Federal employment will be 2.7 percent as compared to 20.5 percent in State-local jobs.

On that basis, State-local employment by 1968 will outnumber Federal employment by more than 8,500,000, or by almost 4 to 1. Federal employment actually will decrease from 13.1 per thousand of the U.S. population in 1964 to 12.7 in 1968.

Thus, the workforce per 1,000 population available to Federal administrators will be declining. The trend points to the necessity of intensified recruitment effort if the Federal service is to hold its own against the increasing competition; also, "productivity improvements will be an urgent necessity if present levels of public service are to be maintained and improved."

State and local governments can be expected to attract a growing share of promising administrative and technical talent, in view of current trends.

White-collar employment in the Federal Government will show the largest gain from 1964 to 1968, the report anticipates—a gain of 123,000 jobs as compared to an increase of 76,000 in blue-collar jobs and 21,000 in postal work. Sixty-one percent of the increase is foreseen in the higher-graded jobs.

Broken down into occupations, the white-collar job gain is anticipated as: mathematics, 2,069; education, 4,110; physical science, 6,604; engineering, 12,190; accounting, 5.075; social science, 1,627; patent, 118; legal, 760; medical, 2,424; agricultural science, 682; veterinary science, 88.

Percentage-wise, the biggest gain would be 58.4 in mathematics, 25.3 in physical science, 21 percent in engineering, 11.4 in social science, 6.7 in medical science, 4.5 in agricultural science and 3.9 in veterinary science.

Computer and management service employment will reflect a sharp rise from 1964 to 1968—44,705 employees in Federal Government as compared to 28,159 in 1964, or a gain of 43.4 percent, the report envisions.

The report contains numerous charts and statistical tables projecting the changes in numbers of employees in each of the major occupational fields during the next four years, supported by detailed analysis of the broad trends.

"Personnel Management for Scientists and Engineers: Status, Critical Issues and Commission Leadership" contains four charts which consolidate and indicate the status of implementing or corrective actions on recommendations concerned with personnel management and certain major organization and management problems found in six reports, listed as:

- Report of Committee on Scientists and Engineers, Apr. 29, 1959.

- Report of the Information Essentials Group, May 5, 1959.

- The Competition for Quality, January 1962 and April 1962.

- Report on Problems in the Management of Federal Research and Development Laboratories, June 1962.

- Report to the President on Government Contracting for Research and Development, May 17, 1962.

- Toward Better Utilization of Scientific and Engineering Talent, a Program of Action, 1964.

For example, in reviewing the status of efforts to deal with the complaint that Government laboratories are very often unable to attract recent college graduates with Ph.D. degrees, the report states:

"The problem is primarily one of a general shortage of people in this category which is becoming serious, and one of attraction. The problem of supply has been under study by the PSAC. Use of quality criteria to qualify for higher grades, higher salaries, and agency efforts to make employment more attractive for researchers should help in attracting Ph.D.'s to Government."

Army R&D Reservist Attends Symposium in Czechoslovakia

A captain in U.S. Army Reserve Research and Development Unit No. 3252, Oak Ridge, Tenn., was among 12 U.S. scientists who attended a recent symposium in Prague, Czechoslovakia.

Dr. Raymond G. Cragle, an associate professor of dairy science assigned since 1957 to the Agricultural Research Laboratory, U.S. Atomic Energy Commission, at Oak Ridge, participated in considering the uses of radioisotopes in animal nutrition and physiology. He is a specialist in the study of nuclear fission product metabolism in dairy cattle.

The symposium was held at the invitation of the Czechoslovakian Government and was jointly sponsored by the International Atomic Energy Agency and the Food and Agricultural Organization of the United Nations. The U.S. scientists attending represented educational, medical, state and Federal organizations

Dr. Cragle is backed by a B.S. degree in animal industry from North Carolina State College (1951), M.S. in animal physiology from North Carolina State College (1954) and Ph. D. in physiology from the University of Illinois.

ARO-D Reports on FY 1964 Research Achievements

(Continued from page 1)

publications are recognized as the primary products of basic research, occasionally results are obtained with implications pointing toward almost immediate applications.

Among the projects having such high-use potential included in the ARO-D report is the Hypersonic Research Program sponsored at The California Institute of Technology, under the leadership of Dr. Clark B. Millikan. This research is concerned with the fact that a body entering the earth's atmosphere at very high speeds leaves behind it a wake of hot, ionized gas that furnishes a characteristic "signature."

Concerned also with high-velocity phenomena is the study by Dr. Martin Sichel, University of Michigan, who is investigating shock-wave phenomena near the throat of a De Laval nozzle. De Laval was a Swedish scientist prominent during the 1880's for his work in the area of hydraulic and steam turbines. He designed the constricted throat nozzle that bears his name.

Dr. Sichel has computed an exact similarity solution of the viscous-transonic equation, describing the flow near the throat of the nozzle. If viscosity is neglected, transonic theory for the flow near the nozzle throat leads to the conclusion—unreasonable from a physical standpoint—that there is a discontinuous transition, as mass flow is increased, between the regime in which the flow is subsonic throughout and that in which the flow is subsonic upstream of the throat, and supersonic downstream.

Inclusion of viscous effects by means of the viscous-transition equation appears to provide a continuous transition between the two types of flow, and resolves a number of paradoxes which arise under the inviscid transonic flow theory.

Quite at the opposite end of the velocity scale is work being done on another ARO-D project by Dr. Robert Novick, Columbia University. He has used an optical Maser to detect flow velocity in fluids down to a minimum of 0.004 cm/sec. Flow patterns in fluids are commonly studied by injecting dyes into the flow stream, and observing the streamlines produced as the dyes are carried along by the current.

For velocities of 0.05 cm/sec or less, such techniques become inaccurate, due to the diffusion of the dye molecules through the medium. Dr. Novick's group used the technique of observing Doppler shifts in the Rayleigh scattered light from monodispersed polystyrene spheres in a dilute colloidal suspension in the fluid medium.

The Laser spectrometer utilizes a 6328 Angstrom unit helium-neon gas Laser as the source. The beam is split into two paths, one of which traverses the scattering cell. The other is single-sideband-modulated for use as an optical local oscillator.

Frequency shifts of the scattered beam were measured as a function of the volume flow rate of the scattering solution and of radial position from the center of the flow tube to its walls. These shifts were converted to flow velocities, using appropriate mathematical relationship, and the results compared to theoretical profiles expected from laminar flow.

Dr. A. G. Milnes and Dr. D. L. Feucht, Carnegie Institute of Technology, direct an ARO-D project on semiconductor heterojunction structures. Heterojunctions are junctions of dissimilar semiconductors. Milnes and Feucht have made theoretical and experimental studies of three classes of new devices: high speed n-n diodes, p-n-p transistor-like structures, and p-n optical devices. Their study of a model for n-n heterojunctions has demonstrated the influence of interface states on the resulting electrical characteristics.

Among other accomplishments, the investigators have studied new methods of growing germanium on silicon and gallium arsenide, and have fabricated a 3-terminal n-n-n heterojunction which offers the possibility of high-speed transistor action. Results are considered promising.

In materials research, Dr. H. H. Uhlig, Massachusetts Institute of Technology, has been exploring the mechanism of stress-corrosion cracking. Specifically, he has studied the problem of defining the minimum amounts of impurities, such as carbon, boron, nitrogen and oxygen, which make iron susceptible to this phenomenon.

Findings are that as little as 0.001 percent of carbon and 0.0003 percent of nitrogen will promote stress-corrosion cracking in a specimen which has first been heat-treated at 550° C. Boron in amounts of 0.001 to 0.008 percent does not induce susceptibility to stress-corrosion cracking to the same degree as do carbon and nitrogen. Oxygen is now thought not to be a contributing factor.

Dr. Uhlig said it appears that the mechanism of stress-corrosion cracking does not depend alone upon the occupation of interstitial sites, but is related also to the chemical properties of the interstitial component.

At the IBM Watson Research Center, Dr. P. P. Sorokin and his coworkers have been doing research on optical Masers with ARO-D support. They have generated "giant" ruby Laser pulses using a saturable organic dye as a Q-switch element. A giant pulse is one which has a peak intensity far exceeding any of the several pulses or "spikes" that are

A SPECIAL BRIEFING for Howard P. Gates, Jr., special assistant to the Assistant Secretary of the Army (R&D), was presented recently at the U.S. Army Satellite Communications (SATCOM) Agency, Fort Monmouth, N.J. Pictured above in the SATCOM Test Operations Center are (l. to r.) Col Eugene Datres, director of the Grounds Systems Department; Mr. Gates; Brig Gen J. Wilson Johnston, SATCOM Agency CG; and Lt Cmdr E. Irvin Lissy, United States Navy, chief, SATCOM Systems Operations Division.

normally emitted when a Laser is pumped beyond its threshold.

Dr. Sorokin's experimental arrangement involves placing a solution of phthalocyanine in line with the ruby Laser, between the unpolished end of the ruby rod and a multiple dielectric reflecting mirror. The ruby is then optically pumped (with incoherent light) to a point where it would normally lase. Initial ruby emission is absorbed by the solution as the phthalocyanine molecules assume excited singlet states. The effect is to defer emission of ruby coherent light from the entire cavity system until larger ruby population inversion is built up by additional pumping.

Saturation of the solution occurs very rapidly, causing the cavity to switch to a high Q-value. Bleaching of the solution and stimulated emission then take place at a very high rate, resulting in the "giant" pulse. Previous techniques commonly used required external power to activate Kerr cells or rotating prisms to adjust the gain or "Q" of the Laser cavity.

The IBM group has attempted another novel approach for obtaining giant pulses. This work involves doping a single host crystal lattice with two ions, one of which is capable of lasing at one-half the wavelength of the other. The hope is that a single photon transition of one of the ions will trigger two photon transitions of the other ion, producing a giant pulse at the longer wavelenth. The theory of this process has been worked out, and experiments are under way to demonstrate the effect.

Subsequent to the preparation of the ARO-D report on the Uhlig accomplishments, an "exceedingly significant" report was received from Dr. Sven R. Hartmann, chief investigator of an ARO-D project at Columbia University, dealing with photon echo resonance. This work confirms a prediction of "super-radiant" states published in 1954 by Dr. R. H. Dicke of Princeton University.

Dr. Hartmann's work involved excitation of a ruby crystal by two short light pulses from a Q-switched ruby Laser, triggered to produce an intense light pulse of about 200 kilowatts for about 10 nanoseconds. The pulse is split so that one part is focused directly onto a small area of a 1-mm thick ruby crystal. The other part of the beam is directed into an optical delay line (mirror network) and then to the crystal, thus providing the second pulse.

At a time after the second excitation pulse, equal to the time separation of the two pulses, the crystal emits a final burst of coherent radiation, which is called a photon echo. This is the first demonstration of superradiance at optical frequencies.

A complete understanding of this phenomenon may lead to the development of Lasers which have a much higher peak power than those available today. Dr. Hartmann's work is reported in the Nov. 9, 1964 issue of *Physical Review Letters*.

Maj Gen Douglas B. Kendrick autographs a copy of his recently published book, "Blood Program in World War II." He bore responsibility for developing the U.S. Army Medical Service blood program at that time. General Kendrick is presently Surgeon, U.S. Army Europe. Previously he served as commander, Ninth Hospital Center, Germany, and as executive officer, then chief surgical consultant to The Surgeon General.

DoD Consolidates Contract Audit Activities

Creation of the Department of Defense Contract Audit Agency was announced Dec. 12 by Secretary of Defense Robert S. McNamara.

Designed to increase the efficiency and lower the cost of Government auditing of defense contracts, the agency will consolidate the activities and the 3,600 personnel of the various contract audit units in the Military Departments.

Under the staff supervision of the Assistant Secretary of Defense (Comptroller), the agency will have a director of major general or comparable civilian rank.

"This consolidation of defense contract audit activities will result in a uniformity of contract audit and related procedures which is lacking today as a result of fragmentation of the contract audit function among three independent organizations," stated Secretary McNamara.

"This situation," he continued, "as well as the fact that under present procedures more than 40 percent of all defense contracts are audited by a military service other than the procuring service, have led independent accounting consultants and the Defense Industry Advisory Council to recommend contract audit consolidation.

"The creation of the Contract Audit Agency is related to the consolidation of contract administration functions accomplished last year. The action does not affect the internal auditing procedures of the Department."

Contract Audit Agency objectives include:

- Uniformity of management, organizational structure, policy direction, and resource utilization for Department of Defense contract auditing.
- More responsive, independent, objective, and consistent contract audit advice to Department of Defense procurement personnel.
- Defense contractors and other Government agency personnel will have a single DoD agency to deal with on this essential facet of procurement activities.
- Elimination of the need which now exists to switch contract audit responsibility, with attendant work disruptions, from one Military Service to another when the preponderance of a contractor's work shifts from one Military Department to another.
- Career training and development opportunities for professional contract audit personnel will be greatly enhanced.
- Savings of five percent in overhead costs will be produced by a reduction of 180 in the number of personnel required for this activity. These manpower savings, which will amount to $1.8 million a year, will be achieved solely by normal attrition, not by a reduction in force.
- A new committee, the Defense Contract Audit Advisory Council, composed of representatives of the Office of Secretary of Defense and representatives of the Armed Services, is being established to advise the Assistant Secretary of Defense (Comptroller) with regard to the Contract Audit Agency.

Sensory Coding

By F. W. Morthland

Dr. Morthland, who has been a member of the U.S. Army Research Office, Life Sciences Division, since 1960, coauthored with Lt Col Louis G. Klinker an earlier Research in Review article (July 1964), "Army Interest in Chemical Research Encompasses Broad Area." Shortly thereafter he accepted a new assignment with the U.S. Army Element, Defense Research Office, Rio de Janeiro, Brazil, as deputy chief of the element and scientific adviser.

Man has shown considerable cleverness in devising machines and gadgets. Only recently, however, has he become aware of the extreme sophistication developed in living organisms by natural evolutionary selection.

We have developed chemical techniques, and, more recently, instrumental techniques for detecting and identifying small amounts of pure chemical substances. The most sensitive of these methods will detect the presence of certain chemicals when diluted with air or other gases 10^{10} to 10^{12} times (that is one part of the chemical molecules in 10 followed by 10 or 12 zeros of molecules of the diluting gas). If one already has a chart showing the typical response of the detector to the detected chemical, it is also possible to identify it. This is quite sensitive in terms of ordinary chemical analysis.

Recent studies, however, have shown that a well-trained dog, of one of those breeds which have been developed for their keenness of nose, can both detect and identify at dilutions up to one part in 10^{10}—ten million times more sensitive than our best scientific instruments. When you consider the relative sizes of the "equipment," the lead that nature has over man becomes more apparent.

In recent years, and with improvements in measuring instruments, a number of scientists and engineers have begun to study the sensory and control systems of living creatures. As a result, several useful devices have been invented, based upon new principles of operation learned from the living world. The housefly has donated a simplified, vibratory gyroscope for position and attitude control of air vehicles. A beetle has taught us how to measure true ground speed by an adaptation of its compound eye. We have learned a good deal about the operation of sonar systems by study of bats and porpoises. Bird migration with its long-range precision navigation is teaching us to look for subtle natural clues in our environment which make localities unique and identifiable.

Accomplishments to date, however, have been superficial in the sense that generally they have only adapted to technology the principles of the initial or detector mechanisms of the animal. The second stage of study now being investigated is at once more complex and potentially of greater rewards. This stage deals with the coding, transmission and evaluation of the information obtained by the detector organ.

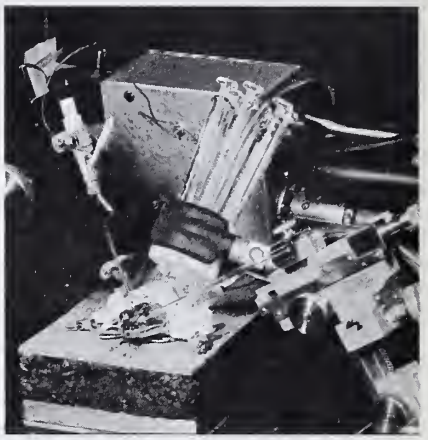
Studies on these coding and interpretive systems, the nerve synapse and the organized brain, respectively, are being approached by several basic methods. There is the logic approach which might be termed the "Aristotelian" method. This operates much as the method developed by Aristotle for science in general. It is characterized by the assembly of observed facts into logical arrays searching for patterns which may be meaningful (but which equally may have no true relation to reality).

This type of effort is characterized by computer science research. It involves the development of electromechanical or fully electronic analogs of natural structures such as the brain neuron. An attempt is made to simulate the observed *functional* activity of the organ such as electrical pulse size, shape and velocity.

These analogs are then stacked into progressively more complex arrays and their interactions are studied. This system combines physical science and mathematical skills in its efforts to divorce the study from the biological and chemical matrix of life.

A second approach is the anatomical-physiological approach. It combines the sciences dealing with gross and microscopic investigation of the structure of the organs and organelles that make up the living matrix in which the action occurs. This approach combines the biological and chemical sciences which deal with physiological structure and the action and interaction of individual chemical processes.

Within recent years both aspects have advanced enormously as instruments and techniques have improved. It is now *almost* possible to visualize individual small molecules, and indeed the atoms in structures, directly by the electron microscope. It is possible by X-ray studies to determine the 3-dimensional relationships of all the atoms in such complex structures as proteinaceous enzymes containing hundreds of thousands of atoms.



IN OLFACTORY NERVE CODING study in frog, microelectrode (left) is connected to preamplifier. Glass tube (right) passes air through nostril to supplant natural breathing. Various odors are introduced with syringe assembly (center) and patterns of nerve pulse activity are observed on oscilloscope (not shown).

The third approach is perhaps best labeled "bioengineering"—a rapidly developing new discipline which seeks to combine the most advanced materials and techniques of the engineering sciences (electronics, chemical, structural, etc.), physics, the biological sciences, and chemistry to synthesize a true and complete picture of the whole complex of the "simple" biological entity. Only by making such a bulky model can we truly begin to adapt the highly developed natural system to other uses, materials and structures.

All of these approaches are obviously interrelated. Refinements in one open new avenues of approach in another, leading to the general advance of all. The pace of progress today is indeed rapid.

Some very fascinating work is being done in the study of single nerve fiber response to stimulus of the detector organ. The first technique developed was that of implantation of exceedingly minute electrodes in nerve fiber bundles in such

a manner that the "message" voltage pulse in only one fiber is detected—and that must be the pulse of the one desired type of fiber among a large number of types in the nerve bundle! Just preparing such electrodes is a research task in itself. It is still more of an art than a science but clever techniques have been developed.

Research under U.S. Army Research Office support[1] by Howard Baldwin of the Sensory Systems Laboratory, Tucson, Ariz., for a study on olfactory systems utilizes a different principle to detect the message pulses of a total nerve. This utilizes a "Hall Effect" device, a specially prepared crystal that gives a detectable electrical pulse when a varying magnetic field is applied to it.

Since the basic laws of electrical currents require that a current flowing in a conductor have an associated magnetic field, the passage of a transient voltage pulse along a nerve will have a similarly transient magnetic pulse associated with it. Mr. Baldwin has demonstrated that a magnetic pulse can be detected in a frog's sciatic nerve.

Eventually, it may be possible to detect pulses of sufficient magnitude to give a recording from a single nerve cell. There are no apparently insurmountable barriers to assembly of an appropriate probe configuration[2]. Translation of feasibility studies to a laboratory tool, however, will take some time since there are many tricky fabrication problems. Development of these techniques has made it possible to perform controlled laboratory studies on the function of sensory systems in detail.

A very fascinating series of experiments on the visual system of the frog has permitted Dr. J. Y. Lettvin of the Massachusetts Institute of Technology[3,4] to reach several conclusions as to just what the messages from the eye tell the frog's brain and how it in turn directs the action of the total animal.

For example, the frog sits quietly on the bank of a pond. He sees but is not consciously aware in detail of his surroundings as long as they remain still. Suddenly a moving object enters his visual field. Different cell arrays behind his retina determine the size, velocity, distance and direction of the object. If it is below a certain size, the brain receives a coded pulse equivalent to "food" and the frog grabs it. If it tastes wrong he can spit it out, but he catches it first on the visual clue. If the object is larger than the selected size, however, the coded message is "enemy" and the whole frog departs precipitously for a healthier location.

In both of these seemingly simple processes, it is interesting to note that the brain does not receive all the individual messages from the rod and cone detector cells of the retina. Rather, these are interpreted by a bed of cells of four different types, located immediately adjacent to the detectors and thus capable of faster interpretation with a smaller message load on the nerve cable to the brain.

An interesting facet of visual system study is the nonmovement of the eye and the response primarily to moving stimuli. There appears to be evidence that this is a characteristic of all animals—that we only see or interpret a moving image. Animals appear to be divided into two groups; those whose eyes remain more or less fixed; and those whose eyes are in constant motion.

The former generally are those who are herbivorous and are preyed upon—eaten (the frog, rabbit, etc.). The eye movers are the predators—the eaters (the hawk, the cats, dog, man, etc.) The former sit still and react to a moving object; the latter move their eyes and bodies and actively seek their food, particularly from among those sitting still. It is an interesting hypothesis, though as yet not proven.

Similar coding and interpretation systems undoubtedly exist for all the senses. Baldwin is seeking to uncover these systems in the olfactory sense. Working with Dr. Lettvin to gain techniques, he has found that the frog can detect minute changes in moisture content of the air. This may be one of the frog's techniques for returning to a pond where he must periodically soak his skin or die. Other subtle odors probably guide him to his home pond and even to the spot on a bank that he has established as his home territory.

IN OLFACTORY STIMULANT study of shark, hydrophone receiver (center) detects and amplifies ultrasonic coded signals while shark swims in sea. The receiver controls three syringes (left) that can pump fluids into either nostril through small tubes at a known rate of flow and concentration. Study is aimed at determining ability of animals to detect and trace olfactory stimulants.

It is Baldwin's aim to extend the work on olfaction to the study of larger animals moving freely in a natural environment in an untethered, unanesthetized condition. These latter conditions require development of highly sophisticated and miniaturized telemetry equipment. This is a specialty which is just beginning to make its impact on biological research. Telemetry of biological responses, coupled with the probing techniques discussed earlier, will spark a major advance in understanding sensory system functions.

Where does this lead, and why is the Army interested in support of such esoteric research? The future nature and materiel of military operations are largely unknown. But it is unequivocal that materiel must be simplified, miniaturized, and be more rapid acting. Information currently available to commanders is overwhelming in its mass and complexity. In the future, his sensors must also interpret so that information which is transmitted has been processed to remove all extraneous data. The receiving and evaluation system must be able to process what it receives and present a synthesis of the situation in an array which allows near-instant decision of action by the commander.

Nature has been working by trial and error selection for over a billion years to develop some very excellent systems for both general and specific uses. Man can drastically shorten the time required for development of similar systems for his needs if he studies the successes and failures of nature, adapting the useful and avoiding repetition of the failures.

BIBLIOGRAPHY. *(1)Baldwin, H. A., Laboratory for Study of Sensory Systems, Contract proposal and quarterly reports on contracts: DA 49-092-ARO14, dtd Apr. 25, 1963; DA 49-092-ARO-28, dtd Jan. 6, 1964.*

(2)Baldwin, H. A., Unpublished communication.

(3)Lettvin, J. Y., H. R. Maturana, W. S. McCulloch, W. H. Pitts, "What the Frog's Eye Tells the Frog's Brain," Proc. Inst. Radio Engr., 47, 1940-51 (1959).

(4)Maturana, H. R., J. Y. Lettvin, W. H. Pitts, W. C. McCulloch, "Physiology and Anotomy of Vision in the Frog," J. Gen. Physiol. 43 suppl., 129-175 (1960).

ATAC to Test First of XM561 Cargo Carriers

Completion of the first of 14 XM-561 cargo carrier prototypes to be delivered under a $4 million Army contract for service testing as a priority item was announced in December by the U.S. Army Tank-Automotive Command (ATAC), Warren, Michigan.

The XM561 is a 1¼-ton, 6-wheeled, articulated vehicle that leads the way toward a new concept in military off-road transportation for forward combat units. It recently was placed in the project management system, under Maj Robert L. Bergquist, to expedite test and development for early production.

Construction of the new vehicle with an articulated joint connecting two aluminum units (tractor and carrier) and individual wheel suspension keeps all six wheels on the ground and reduces body torsional stress. If a wheel should lose traction, a differential lock-out system diverts power to the other wheels.

Because of the unique design, the XM561 frame can be constructed of lightweight aluminum and remain extremely rugged. Curb weight is 6,100 pounds and it is 4-2/3 feet high, 18-1/3 feet long, and 7 feet wide, making it suitable for air delivery by parachute.

Capable of a top speed of 55 m.p.h., the XM561 is powered by a 103 hp. compression ignition engine and can carry 2,500 pounds of payload or 10 combat troops. The vehicle can climb a 26-inch vertical wall and has 15 inches of ground clearance.

The overall superiority in the weight category is based primarily on the capabilities of swimming inland waters and streams, off-road mobility over adverse terrain, ability to keep running on five wheels, reduced requirement for POL logistic support, maximum use of standard military vehicle parts, and versatility and utility through modification kits.

Maj Bergquist said 19 modification kit possibilities will make the XM561 the most versatile wheeled vehicle ever developed by the U.S. Army. It can be converted into a weapons carrier, firing platform for missiles and recoilless weapons, ambulance, command post, fire direction center and mobile communications center. If adopted by the Army, it may reduce requirements for ¼-ton and 2¾-ton trucks.

The XM561 will be tested under all conditions of weather and terrain, including tropical jungles, deserts and arctic snowlands.

To date, four test rigs have been produced for engineering tests by the Army and the Advanced Research Project Agency (ARPA) of the Department of Defense. Ling Temco Vought made the test rigs and is producing the prototypes.

At the age of 33, Maj Bergquist is the youngest of the U.S. Army's project managers, responsible directly to General Frank S. Besson, Jr., CG of the U.S. Army Materiel Command, in managing the XM561 program.

A 1954 cum laude sociology graduate of Providence College, where he earned a ROTC commission in the Army, Maj Bergquist has served in Europe and Viet Nam. He was awarded the U.S. Army Expeditionary Medal and a second Army Commendation Medal for meritorious service in Viet Nam.

WSMR Scientist Reports Theory on Atmospheric Tides

Great surges of atmospheric motion, like tidal streams in oceans, have definite cycles that repeat in a regular pattern according to area, season and the time of day or night.

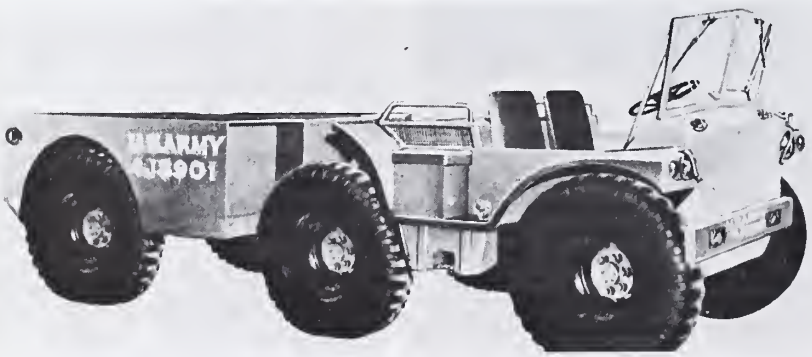
That is the theory on which a young scientist at White Sands (N. Mex.) Missile Range is working in gathering data to prepare "tide tables of the air" regarding conditions that often may have a tremendous effect on missile performance. He believes air tides can be predicted as accurately as those of the oceans.

Bruce T. Miers reported in December that he has proof supporting the theory for his research investigations from results of 17 meteorological rockets fired in a 24-hour period—believed a record for mass firing of weather sounding rockets.

The 7-foot long rockets sent back information on wind speeds and temperatures as high as 50 miles over WSMR. At peak altitude, they ejected metallized parachutes that were tracked by radar to determine wind speed as they drifted toward earth. A tiny thermometer hooked up to a radio transmitter dangling from each parachute sent temperature data.

Miers has put the information into charts and graphs but he still has an enormous amount of work to do to give solid scientific support to his project.

"If he can prove fully the theory of atmospheric tides," said a veteran scientist at WSMR, which is giving Miers full support, "he will have made an enormous contribution to the science of the upper air. Proof of the air tide theory will reduce tremendously the need to make multiple daily atmospheric measurements by balloons and rockets."



XM561 Cargo Carrier

Medical R&D Command Appoints Col Mudgett to Special Projects

The U.S. Army Medical Research and Development Command has announced appointment of Col Louis E. Mudgett, until recently executive officer at Walter Reed Army Institute of Research, as special projects officer.

Col Mudgett has had executive officer assignments for the Office of the Surgeon, Hq., Eighth U.S. Army Korea; Army Surgeon General's Directorate of Professional Services, Washington, D.C., Letterman General Hospital, William Beaumont General Hospital and U.S. Army Hospital, Stuttgart, Germany.

His experience in hospital administration includes 11 years at various Marine hospitals of the U.S. Public Health Service. During World War II, he served in Australia and Dutch New Guinea.

USARJ Hosts Joint Army-Air Force General Educational Development Conference

Military educational programs, problems and progress were discussed during the Dec. 7-11 Joint Army/Air Force General Educational Development (GED) Conference in Tokyo, Japan.

Hosted by the U.S. Army Japan, the conference was attended by 50 Army, 20 Air Force and 20 outstanding civilian and military educators.

"The predominant characteristic of our time is change, the interplay of changing ideas, interests and ideals in a world of instability, insecurity and uncertitude," said Maj Gen Chester W. Clark, CG, U.S. Army Japan, in his welcoming address.

In stressing that the accelerated pace of scientific discovery and technological advance demands a high degree of efficiency from fighting men, he pointed out that the accent today is on the quality serviceman who is better educated, better trained, and more highly motivated.

Military occupational specialization and skill structure have not only increased in complexity, he said, but have also become more readily transferable to civilian society.

"A recent analysis of current skills shows that approximately 80 percent of our listed military occupational specialties are either substantially identical with, or easily convertible to, civilian occupations," he added.

Principal speaker Dr. Edward J. Meade, Jr., program associate, Ford Foundation, N.Y., discussed "Educating Individuals: Problems and Promising Developments."

"All educational programs should be designed in such a way that students who apply themselves in an adequate fashion will succeed," he said. "The price of individualizing instruction and educating individuals will be high if we apply conventional thinking and methodologies to the attempt. Conventional methodology is based on the class as the fundamental unit in education."

Dr. Carl Hancey, University College and Aerospace Safety Division, University of Southern California, outlined courses leading to the degree of "Master of Military Aerospace Management."

The curriculum at USC, he said, is based on the assumption that military and civilian personnel responsible for aerospace management must understand advanced principles of management. Understanding should include aerospace design and production problems, systems development and coordination, and the operational problems of increasingly sophisticated aircraft, missile complexes, space projects and supporting facilities.

EDUCATION OFFICIALS pause for informal conversation with Maj Gen Chester W. Clark, CG, U.S. Army Japan, during 1964 Joint Army-Air Force General Educational Development Conference in Tokyo. (Left to right) Capt. O. T. Knight (USN), Office of the Deputy Assistant Secretary of Defense (Education); General Clark; Dr. Edward J. Meade, Jr., Program Associate, The Ford Foundation; and Lt Col James L. Creekman, Jr., Deputy Director, Defense Language Institute, Presidio of Monterey, Calif.

The "Bachelor of Liberal Studies (BLS) Program," a new frontier in adult education leading to a BLS degree, was explained by Dr. Thurman J. White, dean of the Extension Division and College of Continuing Education, University of Oklahoma.

The student in the BLS Program has flexibility in the sequence of courses by which he is prepared in the areas of humanities, social sciences and natural sciences. He may study the areas one at a time or in combination, selecting the sequence most appropriate to his interests and needs.

Continuing at his own pace, the student may complete one or more area residential seminars each summer until he has completed a total of three, one for each major area. Finally he completes a program of inter-area residential seminar and comprehensive examinations for the degree.

Other notable speakers and topics at the conference included: Capt O. T. Knight, Office, Deputy Assistant Secretary of Defense (Education), "DoD Education Objectives"; Lt Col John L. Covey, "Education in the Air Force";

Col Brilsford P. Flint, Jr., U.S. Army Pacific, "The GED Program"; Dr. Stanley J. Drazek, Associate Dean, University College and Dr. Joseph E. Dellen, Director, University of Maryland, Far East Division, "The University of Maryland"; and Dr. Carlos T. Romulo, Philippine University president, "The University of the Philippines."

Col Elkins Appointed USAERDA Commanding Officer

Col Harry W. Elkins is the new commanding officer of the U.S. Army Electronics R&D Activity (USAERDA), Fort Huachuca, Ariz.

Formerly CO of the Communications-Electronics Agency of the U.S. Army Combat Development Command at Fort Huachuca, he transferred to the Arizona facility in 1963 from Ankara. There he served with the Joint U.S. Military Mission for Aid to Turkey, as chief of the Joint Operations and Training Branch.

A 1937 graduate of the U.S. Military Academy, he served as an Artillery battalion commander with the famous 101st Airborne Division during World War II. He spent two tours at Fort Bragg, N.C., from 1946-48 as commander of the Airborne Artillery Battalions of the 82nd Airborne Division and from 1953-55 as Artillery executive officer of the 82nd Airborne Division.

Col Elkins' experience in weapons evaluation began with assignment to the U.S. Army Arctic Test Board, Fort Greely, Alaska, as test coordinator in 1956. In 1958, he returned to Fort Bragg for three years as chief of the Analysis and Control Division of the Airborne and Electronics Board.

He is a graduate of the Army's Command and General Staff College and holds the Silver Star, Bronze Star, Purple Heart and Distinguished Unit Citation.

Army Announces Contracts Totaling $201 Million

The Ford Motor Co. received the largest share of recent Army contracts for research, development and production totaling $201 million.

Ford's six contracts totaled $19,608,613 for 825 ¼-ton utility trucks, 1,603 light sedans, 513 miscellaneous trucks, 1,152 station wagons, 465 tractor trucks and 7,171 cargo trucks.

Bethlehem Steel Co., New York City, was issued a $14,726,000 fixed-price contract for the construction and delivery of a self-propelled seagoing hopper and boom type dredge.

Kaiser-Jeep Corp., South Bend, Ind., will produce 1,139 5-ton trucks for $14,656,248. The Remington Arms Co., Inc., Bridgeport, Conn., received a $13,425,094 cost-plus-fixed-fee agreement for miscellaneous quantities of ammunition, primers and for operation and maintenance.

Mason and Hanger, Silas Mason Co., Inc., New York City, was awarded a $9,342,744 contract for loading and assembling of 76 mm., 165 mm., 175 mm. projectiles, XM5E5, M17A1 warheads for Hawk and operation and maintenance activities.

Western Electric Co., Inc., New York City, was awarded $7,370,000 for product and production engineering services for the Nike Hercules Missile System. Picatinny Arsenal, Dover, N.J., received $4,236,174 order for 4,657 flare sets, AN/ALA-17, for the Air Force. Holston Defense Corp., a division of Eastman Kodak Co., Rochester, N.Y., received a $3,797,442 modification of a previously awarded contract for miscellaneous items of propellants and explosives.

Sperry Rand Corp., New York City, was awarded two contract modifications totaling $3,588,180 for 155 mm. ammunition and for body section and control surface assembly for the Sergeant missile. PRD Electronics, Inc., Brooklyn, N.Y., was awarded a $3,463,000 fixed-price contract for Microwave Calibration Test Sets, including prototype, specifications, drawings, and training course.

Albion Malleable Iron Co., Albion, Mich., will produce 2.75-inch rocket components for $3,319,624. FMC Corp., San Jose, Calif., was awarded a $3,318,146 contract for 66 transporters for the Mobile Floating Assault Bridge Ferry.

Ancel Propulsion Co., a division of Celanese Corp. of America, Ashville, N.C., received a $3,013,315 fixed-price contract for 4.2-inch illuminating projectiles. Control Data Corp., Rockville, Md., was awarded a $3,000,000 contract for classified equipment.

General Electric Co., Burlington, Vt., was issued $2,800,000 for XM-12 Vulcan Pods. Alder/Westex Communication Division, AMECOM/Litton Systems, Inc., New Rochelle, N.Y., was awarded a $2,781,525 contract for 15 communication centrals, AN/TSC-26.

Norris Thermador Corp., Los Angeles, Calif., will receive $2,201,474 for 266,200 cartridge cases. North American Aviation, Inc., Columbus, Ohio, won a $2,138,000 modification for industrial engineering services for the Roadrunner Target Missile. Radio Corp. of America, Defense Electronics Products, Camden, N.J., received a $2,000,000 order for classified electronic equipment.

Martin-Marietta Corp., Orlando, Fla., was issued a $2,000,000 contract for improved program test station, research and development prototypes for the Pershing missile system. Goodyear Tire and Rubber Co., Akron, Ohio, will produce 73,768 rubber tracked shoe assemblies for use on tanks for $1,716,581. Honeywell, Inc., North Hopkins, Minn., will produce 1,654,710 fuzes for $1,666,293 and International Harvester Co., Washington, D.C., will produce 603 trucks under a $1,422,182 agreement.

Chrysler Motor Corp., Detroit, Mich., received a $1,264,644 contract for 625 cargo pickup trucks. Johnson Furnace Co., Bellevue, Ohio, will produce 5,000 ¼-ton cargo trailers for $1,263,784.

Philco Corp., Communications and Electronics Division, Philadelphia, Pa., received a $1,206,895 contract for Vocoder Systems (voice coders) with ancillary items. Hughes Aircraft Co., Ground Systems Group, Fullerton, Calif., was awarded a $1,200,000 contract for documentation requirements, including drawings and specifications for fire control radar units. Kennedy Van Saun Manufacturing and Engineering Corp., Danville, Pa., was awarded $1,058,270 for 90 mm. target practice tracer projectiles.

Discussing the 40-mm. automatic helicopter armament system at Picatinny Arsenal, Dover, N.J., are Daniel M. Luevano (left), Assistant Secretary of the Army for Installations and Logistics, Col R. S. Crossman, Picatinny project manager for selected ammunition, and Martin Chase, deputy chief of the Warheads and Special Projects Laboratory at the Arsenal. Mr. Luevano reviewed the helicopter armament program and witnessed a demonstration of selected ammunition, including sophisticated nonnuclear munitions. Picatinny is the site of the Army Project Office for Selected Ammunition.

Missile Command Realigns Systems Commodity Offices

The U.S. Army Missile Command, Redstone Arsenal, Ala., has announced consolidation of individual missile system commodity offices into two overall management elements — one for Air Defense Systems and another for Land Combat Systems.

Under the management realignment, Col Cyril D. Sterner will head the Land Combat Commodity Office, which combines the former Honest John/Little John Commodity Office and the Antitank/Aircraft Armaments Commodity Office. He will report directly to Brig Gen C. W. Eifler, Deputy CG, Land Combat Systems.

Col Richard Irvin, Jr., will manage the Air Defense Commodity Office and report to Brig Gen Howard P. Persons, Jr., Deputy CG for Air Defense Systems.

Col Sterner's new responsibilities extend to antitank weapons, including the ENTAC and MAW (medium assault antitank weapon); the M-22 and XM-3 aircraft weaponization programs; and artillery including the Honest John and Little John.

Lt Col C. C. Anderson, who managed the Honest John/Little John Commodity Office, has been transferred to the Shillelagh Project Office.

William C. Rotenberry, who has done considerable work in the aircraft weapons area, is Col Sterner's deputy in the newly established office.

Lt Col John Boyes, former chief of the System Test Division at White Sands Missile Range, N. Mex., has been assigned to the Land Combat Commodity Office to work in antitank developments.

As manager of the Air Defense Commodity Office, Col Irvin will be responsible for directing the Multi-System Test Equipment, Target Missile Division and Air Defense Systems Programs. Maj Jerome H. Ongies will serve as Col Irvin's deputy.

ARO-D Reviews Ceramics Military Theme

"Ceramics for Structural Use" is the latest in a series of reviews of Military Themes suggested by Army in-house laboratories for research programing as priority areas of high scientific merit for investigation.

Military Themes reviews are scheduled and arranged by the U.S. Army Research Office-Durham (ARO-D), Durham, N.C., under the monitorship of the Army Research Office Headquarters in Arlington, Va.

By definition, Military Themes delineate relatively narrow areas of science in which lack of basic understanding inhibits the advance of military technology. Fourteen Themes were listed in a program at the outset of 1964 and each was assigned to a priority group by the ARO-D Advisory Council to stimulate activity.

The review on "Ceramics for Structural Use" departed from established procedure in that, for the first time, the report of the status and accomplishments of each project was presented by the investigator. Normally, progress has been summarized by the ARO-D coordinating scientist.

The program of research in structural ceramics was initiated because these materials characteristically possess an unhappy mixture of desirable and undesirable properties.

Many available commercial ceramic materials offer high melting or softening temperatures, structural rigidity over a wide temperature range, and outstanding resistance to corrosive environments.

Partially offsetting these advantages, however, is brittleness which makes ceramic bodies sensitive to mechanical shock, and which may persist as the temperature is raised even to 1200° C.

Research in structural ceramics to meet Army requirements therefore is directed toward discovery of principles whereby strength may be augmented, and also to make possible a useful degree of elasticity.

The ARO-D Military Theme investigations involve slip and deformation of ceramic materials at various temperatures; the effects of impurities and porosity upon strength and ductility; the adaptation of such metallurgical procedures as forging, heat-treatment, and explosive deformation to the modification of ceramics; and improvements in the mechanical and physical properties of oxidized ceramic substances.

The recent review meeting at ARO-D yielded reports indicating that significant improvements have been achieved to date in the state-of-the-art consonant with Military Theme objectives. Research is being continued.

Participants in the review included the chief investigators of the six active projects in the ceramics Theme research, ARO-D scientists concerned with the projects, and seven representatives of other Army installations having direct interest in the program.

The schedule for Military Theme reviews for 1965 includes: High Pressure Temperature—Jan. 14; Semiconductors—Mar. 17; Laser and Iraser—May 6; Thin Shell Studies—July 14; Corrosion—Sept. 14; Upper Atmosphere Gaseous Electronic Processes—Nov. 17.

Canada, U.S. Test Mobility In Exercise Polar Strike

Army and Air Force elements of the United States and Canadian Armed Forces are participating this month and next in a joint combined mobility and Alaskan Command field training operation, Exercise POLAR STRIKE.

Actual field operations will be conducted from Feb. 4-17 in the interior Alaska area east of Northway, Tetlin and Delta Junction in the Mount Fairplay and Mount Harper region.

POLAR STRIKE is an exercise directed by the Joint Chiefs of Staff to evaluate plans for reinforcement of the Alaskan Command by elements of the U.S. Strike Command and for continued operations in Alaska.

In addition, the Exercise will assist in the evaluation and development of procedures for the command and control of joint forces, provide information on cold weather operations, and test equipment under Arctic conditions.

POLAR STRIKE will involve Headquarters, Alaskan Command and units of the Alaskan Air Command, U.S. Army Alaska; U.S. Strike Command; and Army and Air Force elements of the Canadian Armed Forces.

STRATCOM Announces HQ Staff Assignments

Headquarters staff assignments announced recently by the U.S. Army Strategic Communications Command include: Col Kenji Hino, director of Engineering; Lt Col Rudolf H. Folts, director of Logistics; and Lt Col Sherman D. Randa, director of Personnel and Training.

Col Hino served as chief, Strategic Communications Division, Office of the Chief of Communications-Electronics, Washington, D.C., until taking over his new duties. He has a master's degree in electrical engineering from the University of Wisconsin, a bachelor's degree from the University of Illinois, and has completed the Command and General Staff College, the Armed Forces Staff College and the Advanced Signal Officer course.

Lt Col Folts is a graduate of the University of Illinois, where he later served as an ROTC instructor. He joined STRATCOM following a year's assignment with the Logistics Division, Army Section, Military Assistance Advisory Group in Taiwan.

Currently on the list selected for promotion to full colonel, he earned a master's degree from Harvard University in 1951 and graduated in 1956 from the Command and General Staff College.

Lt Col Randa formerly was director of Personnel and Training at STRATCOM and served two tours of duty in Turkey, including a year's service at Erburum as the signal adviser to the Third Turkish Army.

Col Kenji Hino | Lt Col S. D. Randa | Lt Col R. H. Folts

Protection of Soldier Paramount to Natick Laboratories Human Factors Engineers

Establishing guidelines for human factors engineering in design of equipment which will better protect the U.S. Army soldier in climatic extremes is an important part of the mission of the U.S. Army Natick (Mass.) Laboratories.

Using climatic chambers, Natick human factors engineers determine the effects of weather conditions on sensory and psychomotor performance. They also provide human factors consultation and guidance for other Natick R&D projects.

Human engineering information is routinely provided in handbook form for desk-top use by engineers and designers, particularly in relation to the human aspects of cold and hot weather equipment operation.

Recommendations have been furnished to improve compatibility in combined use of items such as the field jacket, arctic hood, steel helmet, pile cap, gas mask and chemical-biological-radiological (CBR) hood.

Natick human engineers aided redesign of the 6,000-pound all-purpose forklift truck by assisting in the sizing, control layout, logic of control use sequence, and improving the field of view and comfort of the operator.

Guidance for ration development has been provided for a number of years through comprehensive surveys of military food preferences, attitudes toward food and feeding practices, and basic research on the nature of taste and odor perception.

Studies are now being conducted in the technical requirements of equipment by determining the nature of the soldier's field duties in different geographic and environmental conditions throughout the world.

This approach will help to establish guidelines on how the equipment must function to help the soldier do his job. One such study was recently completed by an 8-man team of military and civilian researchers at the Jungle Warfare Training Center, Fort Sherman, Panama Canal Zone.

Combat-type activities, use of clothing, individual equipment and rations, and relevant geographic and climatic data were recorded. Similar studies are planned for other countries.

The Natick Laboratories also function on an Army inter-Command basis. A recently completed study for the Transportation Research Command was designed to determine how much helicopter armament restricts the visual field of the pilot.

Natick human factors scientists have participated in periodic winterization tests of the Sergeant, Pershing and other missile systems to advise on personal equipment problems of operators.

During the past year, a field study was designed by Natick psychologists for the U.S. Army Engineer Research and Development Laboratory, Fort Belvoir, Va.

This study evaluated the efficiency of camouflage of the individual soldier and resulted in the first qualitative data on the relative effectiveness of several detection systems.

Assigned sole cognizance for all Army anthropometric data, Natick Labs personnel determine essential body size information for the design of clothing and personal equipment.

Guidance has been furnished in development of a variety of items such as handwear, footgear, armor vests, flight helmets and fuel handler suits. Inter-service and international anthropometric aid has been furnished.

A Natick anthropologist, working along with the U.S. Air Force, participated in the first extensive survey of body size and variation among NATO military personnel of Turkey, Greece and Italy.

During the past year, a Natick anthropologist visited a Far East ally and trained local military personnel in data collection. The anthropometric information obtained is being analyzed for use by that country as well as the U.S. Army.

Current research and the development of a library of such anthropometric information, will enable the Engineering Psychology Laboratory to respond quickly to needs generated by any future military crisis.

The Engineering Psychology Laboratory at Natick and the Human Engineering Laboratory at Aberdeen, Md., are the two major organizations which conduct human factors research in the U.S. Army Materiel Command, of which the Natick Laboratories are a field agency.

Although independent, these efforts are closely coordinated to insure complementary functions and avoid duplication of activity.

USAPRO Employee Heads Psychological Association

A distinguished woman psychologist with the U.S. Army Personnel Research Office (USAPRO), Washington, D.C., assumes office this month as president of the District of Columbia Psychological Association.

Mrs. Bertha H. Cory, chief of the Statistical Systems and Computer Branch at USAPRO, will preside over the third largest of the state associations of psychologists. The Washington chapter has 700 members.

Four other USAPRO members also hold office in the organization. Dr. John G. Tiedmann, Monitor Performance Task leader, is treasurer; Dr. A. G. Bayroff, Input Quality Task leader, is council representative; E. F. Fuchs, chief, Military Selection Research Laboratory, is appointed to the DCPA Board of Examiners; and Laverne K. Burke, senior statistical systems analyst, is editor of the DCPA Newsletter.

Mrs. Cory, who obtained her B.A. (summa cum laude) and M.A. degrees in psychology from the University of Rochester, joined USAPRO in 1949.

Previously she was acting director of the Bureau of Educational Statistics at the University of Rochester and taught courses in general psychology, tests and measurements, psychological testing and machine methods in statistical research. From 1943-49, she was an editor of the Journal of Educational Psychology.

Mrs. Cory is a certified psychologist in the State of Maryland. She is a member of Phi Beta Kappa, Sigma Xi, the Psychometric Society, the Association for Computing Machinery, and the American Psychological Association plus three of its sectional affiliates.

Berth H. Cory

In addition to planning and supervising computational support operations for USAPRO, she serves as a panel member of the Board of U.S. Civil Service Examiners in Research Psychology. From 1954-60 she was the Army member and chairman of the Department of Defense Ad Hoc Working Group on (Test) Scoring Devices.

Since 1962 she has been a member of the Steering Committee of the Army Group on Scientific and Technical Information. As a consultant she has served Science Research Associates in Chicago, Project Talent of the American Institute for Research, and the D.C. Health and Welfare Council. She also has published several reports on research studies.

Stereo Viewer Aids Image Interpretation

A 3,500-pound stereo comparison viewer, a product of electro-mechanics and fiber optics research, is proving its value in interpretation of aerial photographs at U.S. Army Electronics Proving Ground (USAEPG), Fort Huachuca, Ariz.

Fiber optics—the bending of light rays around curves through bundles of tiny strands of glass—made the viewer possible. It was designed and built by OPTOmechanisms, Inc., of Plainview, N.Y., for the Image Interpretation Branch, Surveillance Division, Test Plans and Evaluation Department, USAEPG.

Col James L. Burke, chief of the Department, said the viewer will be used to evaluate the performance of new aerial cameras and film sent to USAEPG for testing. It also may lead to smaller and lighter models for future tactical use.

Project engineer in charge of its development is Matthew J. McGoey. Capable of performing the functions of several separate instruments, it was designed to meet specific requirements by Army aerial photography interpreters to increase the speed and accuracy of finding, measuring and identifying targets on aerial films.

In conventional stereo viewers the images picked up by the objective lenses travel through a system of mirrors and prisms to the eyepieces. The fiber glass cables eliminate the mirrors and prisms; they are flexible and can be twisted or bent without altering the image.

As a result, the two stereo lenses on the new viewer can be moved independently as much as 9 inches across the film and 18 inches along its length, allowing a total separation of the lenses as great as 36 inches.

Furthermore, by switching to any three of the turret-mounted objective lenses, which are combined with a zoom lens, the magnification can be changed independently so that the interpreter can compare objects appearing on films of different scales (taken at different altitudes).

The films are advanced or backed up by motor-driven reels. The objective lenses may be switched from a wide-angle view taking in as much as a circle 3.5 inches in diameter to a small section magnified 33 times.

To measure what he sees on the film, the interpreter projects a pin point of light onto the image appearing in the eyepieces. This becomes a pointer or reticle, moving across the image as the turret heads scan the film.

A mechanical linkage follows the movement of each of the heads and actuates an electronic counter, which —like the trip mileage meter in a car —displays the extent of their movement in hundredths of a millimeter. To maintain such accuracy, the components of the viewer are mounted on an 1,800-pound special casting.

The fiber glass cables which transmit the light from the objective lenses to the eyepieces contain millions of tiny fibers so fine (each 10 microns in diameter) that 36 of them would be no larger than a human hair. Yet they are so flexible that the images can be rotated 360 degrees by merely twisting the ends of the cables.

One of the problems which had to be solved before fiber optics could be used was that normally the ends of the fiber glass strands are visible in the image and, when one is broken and no longer transmits light, a black dot appears. The result is a speckled-honeycomb effect which, however, has been eliminated by a patented shutter, called an image enhancer. This allows an extremely fine resolution of 200 lines per millimeter.

70mm. Micromap Camera Slated For Delivery to GIMRADA

A 70 mm. micromap camera is scheduled for delivery to the U.S. Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency (GIMRADA), Fort Belvoir, Va., the developing agency, late this month.

The basis of a system designed to eliminate logistical problems in printing, storing and displaying military maps, the camera was built by Latady Development Co., Inc., Philadelphia, Pa.

Designed for transport and use in standard Army mobile map reproduction vans, the rigid and precise camera produces 70 mm. micromaps from standard military maps.

Two thousand of the micromaps may be stored in the target map locator, the system's second major component, and projected at will for individual viewing. The camera will have a reduction range ratio of 6:1 to 10:1 and will produce a maximum range image format of 64 mm. x 94 mm.

In composite photo of stereo comparison viewer (upper left), SFC Paul Vickers, Test Plans and Evaluation Department, looks through eyepiece. Arrows show fiber glass cable connecting left stereo head with eyepiece (lower left), closeup of eyepiece with controls; (upper right) joystick (5) used to control movements of stereo heads; (lower right) Col James L. Burke, chief, Test Plans and Evaluation Department, is introduced to viewer by Mathew J. McGoey, project engineer. Dotted lines depict path of image from film (1) through lenses in stereo heads (2) through cable (3) into eyepieces (4).

USAEPG Copes With RFI in Military Communications

Radio Frequency Interference (RFI) is little more than an irritation to the average television viewer when, coming from a "ham" radio transmission, it interrupts his favorite program.

To the U.S. Army, however, RFI is a matter of immediate and increasing concern as the multitude of electronic equipment issued to units continues to grow. RFI may present major threats to a commander's ability to control his forces, often spread out over many square miles.

In 1960, after years of preliminary study, the U.S. Army Electronic Proving Ground at Fort Huachuca, Ariz., was handed the responsibility of investigating RFI problems, particularly where they concern combat units.

To accomplish this mission, the Electromagnetic Environment Test Facility was built near Gila Bend, Ariz. It encompasses 2,400 square miles of desert land, thus providing enough area to test military communications equipment under realistic conditions.

The various types of military communications equipment and other electronic systems used by the Army which contribute to the electromagnetic environment are at the Test Facility. Involved are some 340 pieces of environment-generating *EG* equipment at 8 sites, placed to provide a picture of the communications network of an Army Corps. Four additional standby *EG* sites are planned.

Certain technical consistencies became evident in operation of the Facility. Some factors appeared so repeatedly and precisely that it was possible to establish these as standards, making practicable the use of Fort Huachuca's 7090 IBM computer. A program was initiated and eventually a new set of initials became prominent in shop-talk discussions.

IPM, for Interference Prediction Model, afforded designers of communications and other electronic equipment a preview of the effect proposed items would have on the electromagnetic environment in relation to existing procedures and processes. This minimized expensive trial-and-error test programs.

Additionally, it eliminated the necessity for the extensive complex at the Test Facility, permitting reduction to eight sites, with what is expected to number about one-third of the environmental generators originally needed.

The introduction of the latest control equipment at Gila Bend has improved its capacity and capability for research into RFI. Automation of the facility provides complete central control. By the use of a punch-card system, complete tests can be run every 30 seconds. Results are studied in preparing recommendations for modification and determination of the compatibility of new radio equipment with existing electronic systems.

Control of the Gila Bend testing facility is the responsibility of the Fort Huachuca Field Test Facilities Department, which maintains some of the most precise test and evaluation complexes in the world.

ASA (R&D) Briefed on Tropic Test Center, Canal Zone

Assistant Secretary of the Army (R&D) Willis M. Hawkins receives briefing on Radio Antenna and Propogation Test equipment during recent visit to the U.S. Army Tropic Test Center, Ft. Clayton, Canal Zone. L. to R. are LeRoy Craig, U.S. Army Electronic R&D Labs; Brig Gen Lawrence E. Schlanser, deputy commander, U.S. Army Test and Evaluation Command (TECOM); Secretary Hawkins; Lt Col Stanley Y. Kennedy, executive assistant to the Secretary; and Col Pedro R. Flor Cruz, CO of the Center. Because of its location in the Canal Zone, which contains a cross-section of environmental conditions found in most of the humid tropical areas of the world, the Center is one of three environmental test centers operated by TECOM headquartered at Aberdeen Proving Ground, Md. In addition to briefings on the Center, Secretary Hawkins and his party visited General Andrew P. O'Meara, Commander-in-Chief, U.S. Army Southern Command; Maj Gen James D. Alger, Commander, U.S. Army Forces Southern Command; and Maj Gen Robert J. Fleming, Jr., Governor of the Panama Canal Zone.

DoD to Establish Complex For Industrial Clearances

Consolidation of industrial personnel clearance functions now performed at more than 100 locations throughout the country will be effected when the Defense Industrial Security Clearance Office opens in Columbus, Ohio, in March.

Present plans call for 173 employees to man the new operation, which will be directed by the Defense Supply Agency. Columbus was chosen because of its central location and the availability of adequate Government facilities there which can be adapted to the new operation.

All employees now in the industrial security personnel clearance system of the Military Services and the Defense Supply Agency will be given an opportunity to transfer to the new office in Columbus, located within the Defense Construction Supply Center.

The Government will pay moving costs for all personnel with transfer rights who accept employment in the new installation, Defense officials stated.

The Defense Industrial Security Clearance Office will assume responsibility for security clearances of Defense contractor employees who requires access to classified information in connection with classified Defense contracts. Clearances are now processed by the three Military Departments.

The consolidation in no way affects the office of Industrial Personnel Access Review, OASD (Manpower), which remains responsible for final adjudicative actions resulting in denial or revocation of industrial security clearances.

Establishment of the Defense Industrial Security Clearance Office is part of the Department of Defense plan to consolidate under central management some 200 organizations of the Military Departments engaged in contract administration services during the next 18 months.

Fort Lee to Maintain Tech Data Inventory

Maintenance of an Inventory of Department of Defense Technical Data Actions and Related Efforts is now a function of the Defense Logistics Studies Information Exchange at Fort Lee, Va., recently.

Operated by the U.S. Army Logistics Management Center, the DoD Exchange was established in July 1962 to collect, store and disseminate information about logistics research and doctrine. The Center is a field activity of the Army Materiel Command.

The new inventory mission requires the Exchange to collect, store and disseminate information about technical data management improvement actions underway or planned by the military departments and DoD agencies.

Projects to be cited are studies, tasks, or programs directly applicable or related to improvement of technical data management. This includes actions to improve data preparation, acquisition, storage, retrieval, reproduction, display, exchange, distribution, utilization, and system/program development or operation.

The purpose of the Inventory of DoD Technical Data Actions and Related Efforts is to provide management at all levels with an information and control system whereby technical data improvement actions are reviewed and evaluated for consistency with the objectives of the DoD Technical Data and Standardization Program.

A Department of Defense instruction outlining requirements and procedures for input of information to the Exchange will be issued at an early date. In the meantime, information concerning new and/or established technical data improvement actions is solicited.

Correspondence in this regard should be addressed to: Commandant, U.S. Army Logistics Management Center, ATTN: DLSIE, Fort Lee, Va. 23801.

Redstone Missilemen Diverted by Watusi Jumper Query

To stimulate a 10-year-old boy's interest in science, engineers at the U.S. Army Missile Command, Redstone Arsenal, Ala., recently turned their attention to the problem he posed on the Watusi jumper.

Harry Hall, a missile maintenance technician stationed in Panama, where he and the boy are neighbors, received the initial inquiry. The Missile Command's Directorate of Supply and Maintenance has people like Hall stationed throughout the Free World.

Mike Munsil had read about the Watusi, who live in the equatorial belt of Africa and are champion high jumpers. Mike knew that gravity is less at the equator than at the North Pole and reasoned, in a handwritten letter to Hall, that "if you took a record-breaking Watusi jumper to the North or South Pole, he would not be able to jump nearly so high. I want to know if gravity helps the Watusi jumper or not."

Harry Hall was stumped and wrote to his colleagues in the Air Defense Branch, Technical Assistance Division, Directorate of Supply and Maintenance at Redstone.

A few days later, Hall and Mike got their answer. Missile Command scientists stated that the Watusi jumper may be able to get a little better altitude at the equator than at the North Pole but the amount would be negligible. It would take an instrument far more accurate than a field judge's tape to measure the difference.

Contract Calls for Refitting Mobile Bridge Ferry Units

Awards of nearly a million dollars in smaller contracts were announced recently by the Army Engineer Research and Development Laboratories, Fort Belvoir, Va. The main contract of $459,977 was to Chrysler Corp. for refitting 12 mobile floating assault bridge ferry vehicles.

Designed to surmount inland water obstacles in assault operations, the mobile floating assault bridge ferry is a self-propelled amphibious vehicle that can travel overland at 35 miles an hour and enter the water without previous preparation.

Three-man crews of four vehicles have assembled a 4-unit ferry in 6 minutes. Crews of 16 units can build a 400-foot bridge in 20 minutes.

Other contracts: $348,000 grant to the Garrett Corp., AiResearch Manufacturing Co., Los Angeles, Calif., to design, fabricate, test and deliver an advanced power conversion experimental facility recuperator for the Nuclear Power Field Office (NPFO); $95,000 contract for an ammonia production feasibility study, also for NPFO, to General Motors Corp., Allison Division, Indianapolis, Ind.; General Acoustics Corp., Los Angeles, Calif., $86,957 for procurement and installation of a portable clean room for the U.S. Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency.

Former Army Research Leader Achieves 2-Star Rank

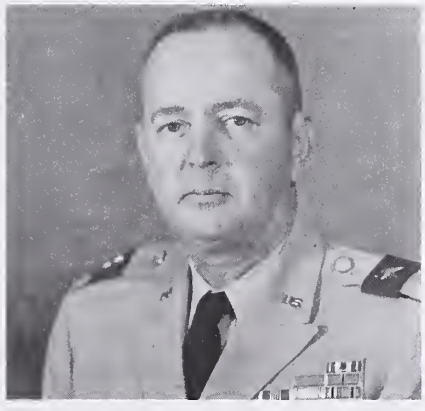
Former Assistant Director of Army Research William W. Beverley advanced to major general rank Dec. 1 when Maj Gen Julian A. Wilson, chief, Office of Personnel Operations, Department of the Army, pinned on his second star.

Currently assigned as director of Enlisted Personnel, Office of Personnel Operations, General Beverley served in the Army Research Office from December 1960 to October 1961. Lt Gen William W. Ely, now Deputy Director of Defense Research and Engineering (Administration and Management) was then Director of Army Research.

Graduated from the U.S. Military Academy in 1938, General Beverley is also a graduate of the Army Field Artillery School, the Army Armor School, Command and General Staff College, Armed Forces Staff College, and the Army War College.

Upon leaving the Office, Chief of Research and Development, he served as CG, 2nd Armored Division Artillery, Fort Hood, Tex. (1961-62), then was assigned as military assistant to the deputy director Tactical Warfare Programs, Office of the Director of Defense Research and Engineering, prior to assuming his present position.

The record of his major assignments includes: department director, U.S. Army Artillery and Missile School, and commander, 52nd Artillery Group (1957-59); chief of Army Section, U.S. Military Assistance staff in Belgrade, Yugoslavia (1955-57); Office, Assistant Chief of Staff, G-2 (1951-54); and Armored Artillery Battalion commander, European Theater (1942-47).



Maj Gen W. W. Beverley

ES Division Studies Environmental Effects on Army Operations

This special article on the Environmental Sciences Division is the first of a series that will report on the functions of the various divisions of the U.S. Army Research Office in planning and monitoring the Army-wide research program. The article is intended to answer many of the questions that have been received regarding the mission and scope of Army Research Office activities.

Within the broad scope of authority delegated by the Chief of Research and Development to the Director of Army Research, the Environmental Sciences Division of the U.S. Army Research Office exercises staff supervision over a program worldwide in scope.

Responsibilities of the ES Division include research and exploratory development in astronomy, astrophysics, aeronomy, meteorology, geography, oceanography, earth physics, cartography, geomorphology and geodesy.

The Division provides staff coordination for research, development, testing and evaluation activities in extreme environments of the tropics, desert, arctic and remote undeveloped areas.

Scientific investigations in many parts of the world, monitored by the ES Division, seek a more thorough knowledge and understanding of specific conditions of environment in which the American soldier and his equipment must operate.

The goals of environmental research are improved mobility, communications, firepower and optimum protection of the soldier and his equipment against environmental conditions impairing maximum effectiveness.

The ES Division monitors projects in or intimately related to the environmental sciences as conducted by the U.S. Army Materiel Command, Chief of Engineers, Office of The Surgeon General and by scientific organizations in many foreign lands through branches of the U.S. Army Research Office.

The Division supervises grants and contracts awarded to educational institutions, nonprofit research organizations and industrial enterprises qualified for environmental sciences research, development, testing and evaluation (RDT&E) activities.

After impartial evaluation by consultants of the U.S. Army Scientific Advisory Panel (ASAP), the Division initiates action to award those grants or contracts which pass and can be expected to influence the on-going research program of the Army.

Under Dr. Leonard S. Wilson as chief, the division has three branches: Geophysical Sciences, headed by Dr. Hoyt Lemons; Special Projects, supervised by Dr. Fernand P. de Percin; and Regional, under Dr. Lester W. Trueblood. All are recognized leaders in their respective fields.

The Geophysical Sciences Branch supervises and provides staff guidance in two main R&D areas: 1) earth sciences such as geography, geology, oceanography, cartography, geodesy and earth physics; 2) the atmospheric sciences, including me-

Environmental Sciences Division Staff Leaders

DR. LEONARD S. WILSON, chief, Environmental Sciences Division, USARO, since 1958 . . . member of The Army Research Council since January 1964 . . . chief, Environmental Research Branch, OCRD, 1955 . . . University of Michigan, A.B., M.S., and Ph. D. degrees in geography, Earhart and University Fellowships . . . professor, Carleton (Minn.) College . . . lecturer, University of Wisconsin . . . began Government career in 1942 . . . Navy, lieutenant commander, 1943-47 . . . map officer, geographic adviser and author throughout career.

Dr. HOYT LEMONS, chief, Geophysical Sciences Branch since 1957 . . . Army project officer, HARP . . . Army IGU representative . . . B.E, U. of Nebraska, M.A., Ph. D., U. of S. Illinois, professor, climatology, University of Maryland . . . staff assistant, Environmental Research Subpanel, ASAP . . . served on faculties Washington State University and Oklahoma State University . . . consultant, Army Quartermaster General . . . listed, "American Men of Science," "Who's Who in Southeast," "Directory of American Scholars" . . . author, lecturer, member of numerous professional societies.

DR. LESTER W. TRUEBLOOD, chief, Regional Branch, USARO, since 1959 . . . B.S. degree, Indiana State Teachers College, M.A., Ph. D., geography and international affairs, Clarke (Mass.) University . . . lecturer in geography and head of department, Judson College, University of Ragoon, Burma . . . geography consultant, Secretary of War, 1942 . . . research specialist, G-2, S.E. Asia . . . progressive assignments with Army Map Service, Army Corps of Engineers, 1950-59 . . . member various geographical societies.

Dr. Fernand P. de Percin, chief, Special Projects Branch, USARO, since June 1963 . . . polar research specialist, USARO, 1960-61 . . . National Science Foundation, 1961-63 . . . B.S., physics and mathematics, Rutgers 1943 . . . Army Air Corps weather officer, WWII . . . M.S., meteorology and climatology, California Institute of Technology . . . professor, Pennsylvania State University . . . Quartermaster Research and Development Field Office, Va., 1948-53 . . . Quartermaster R&E Command, Natick, Mass., 1953-60.

teorology, aeronomy and astronomy-astrophysics.

Through the monitoring of Army-wide programs of research in its assigned areas of interest, the Geophysical Sciences Branch seeks answers to:

Environmental problems associated with improved military materiel design; better surface mobility under all conditions of terrain; more comfortable and lightweight clothing that will provide maximum freedom of movement in extreme environments; and methods of maintaining and storing equipment to make certain it will be ready for efficient service when and where needed.

The GS Branch is responsible for non-issue type meteorological equipment development and for the program in which meteorological field teams support Army research, development, testing and evaluation projects.

An outstanding example of RDT&E activity is the high-altitude research program, involving the use of weather balloons, sounding rockets and the new 5-, 7- and 16- inch gun probes at altitudes ranging from 150,000 feet to more than 500,000 feet.

Another main area of GS Branch activity is surface mobility research. This includes investigations of soil mechanics, geology, geography and various other subjects to improve the design of vehicles for a broad variety of off-road mobility requirements.

Research projects monitored by the GS Branch are conducted in all environments and in all parts of the world—to insure that the Army will have a proven capability of operations for any emergency that may arise. Meteorological investigations are carried on in the polar regions, European countries, the Pacific theater and throughout the United States.

Similarly, geodetic, gravity, air-photo interpretation and terrain mobility studies are made in the U.S., Europe and a number of other areas, as are mapping activities. An extensive program of research in mountain glacial environments is done in arctic and antarctic areas.

The Regional Branch is concerned with different types of extreme environments in which the soldier and his equipment must perform effectively to achieve military objectives.

The Branch has responsibility for preparing programs that will lead to development of better equipment and more realistic training and planning for operations in extreme environments. In actuality, the Branch functions as a "catalytic agent" in dealing with other General Staff elements and other divisions within the Office of the Chief of Research and Development for RDT&E problems pertaining to the cold regions, humid tropics and desert areas of the world.

Emphasized in the work of the Branch are the extreme environments —to determine and define, through consultation with scientists and engineers in the Army and as necessary with other agencies, the significant stresses upon personnel and equipment and how to overcome attendant problems. The Regional Branch is charged with staff supervision of research and advisory coordination of RDT&E programs concerned with extreme environments.

For example, the tropical environments, which account for somewhat more than 20 percent of the world's land surface, impose a variety of stresses and deleterious conditions because of continuous heat, high humidity and heavy rainfall.

Rot, corrosion, mildew, rust and other forms of deterioration of military materiel in these conditions must be carefully considered, based on results of comprehensive investigations, to meet military requirements.

Other factors involved in the tropical environment are the deep mud, dense vegetation, numerous streams and rivers, difficulties in communications, tropical diseases, irritating insects, poisonous vegetation and a variety of conditions which impede operating efficiency and physical well-being of troops.

Special Projects Branch. Continuing expansion of the Environmental Sciences Division's responsibilities in recent years has increased activities for preparation of budget programs and for formulating research programs, long-range plans and technological forecasts for the environmental sciences.

The Special Projects Branch was created to function in these areas, that is, to exercise primary responsibility for all actions related to budget and financial program management. The Branch formulates long-range research and exploratory development goals for the ES Division which meet the needs of the Army's operational plans and future requirements.

Working in close coordination with the Geophysical Sciences and Regional Branches, the Special Projects Branch analyzes documents such as Joint Plans and of Army operational plans to provide guidance for R&D phases of the environmental sciences program.

The Branch contributes to the Army Research Plan, the Long-Range Technological Forecast, and to other Advanced Scientific and Technological Studies, as required.

The Branch also provides staff coordination of the environmental sciences program special projects with the U.S. Army Materiel Command, the Office of the Chief of Engineers, the Office of The Surgeon General, and other organizational elements as necessary.

While serving as Chief of Staff of the United States Army, General Maxwell D. Taylor outlined some goals of the Army by saying:

"In order to meet enemy ground forces in any part of the world at any time and impose the U.S. national will upon the enemy nation, it is imperative that we improve our mobility, communications, firepower and protection of the soldier. . . ."

General Harold K. Johnson, Chief of Staff, writing in the June issue of Army Magazine, designated firepower, maneuverability, logistics, communications and intelligence as the prime considerations of the modern Army.

In the recent TARC Report submitted to ASA (R&D) Willis M. Hawkins, The Army Research Council stated that the Environmental Sciences are the only disciplines having an across-the-board relationship to all of General Johnson's classifications of Army functions.

On 17 June 1964, ASA (R&D) Hawkins stated to the biennial Army Science Conference at the U.S. Military Academy:

. . . "Since the European theater is the kind of theater that we understand and knew pretty well, we've done reasonably well in trying to figure out what the environments were and trying to create weapons systems, equipment and tactics and doing the training necessary to fulfill this responsibility. I think as I look back over the programs that the Army has been engaged in, we have solved this problem quite well. Korea first and now Viet Nam hands us entirely different kinds of challenges. . . ."

The Environmental Sciences program is designed to improve the Army's functional performance as outlined by the Chief of Staff and to expand environmental knowledge and understanding as emphasized by ASA(R&D) Hawkins.

Select Committee on Research Issues STI Report

(Continued from page 3)

a policy of decentralization," defined in COSATI's report as follows:

"The objective of COSATI is to contribute to the formation and development of an articulated but decentralized Federal system designed to provide an important tool for improving research and development both in and out of the Government."

One of the significant conclusions of the report is stated as:

"From their submissions and from other evidence, the Committee has received the impression that the departments and agencies have high standards for their scientific and technological information programs, and are making genuine efforts to observe them. There is not always, however, an awareness of needs or interests that transcend their own. Even where an office has set itself the goal of cooperating with others, that cooperation is rendered less than effective by limited agency-oriented attitudes."

Problems of collection and utilization of foreign scientific and technical literature, and progress in developing high-speed methods of machine translation, also are considered in the report. U.S. Library of Congress exchange agreements have been effected with every country except North Korea, Outer Mongolia and Communist China.

Twenty-six additional U.S. Federal agencies have supporting agreements with their counterparts in foreign countries—for example, the National Agricultural Library has reciprocal plans with 160 countries.

Among recommendations submitted to Congress by the Committee are:

- That COSATI exercise a strong initiative in refining glossaries and coordinating thesauri among the disciplines and in Federal agencies.
- Standardization of systems and formats, so far as is possible and feasible to achieve in light of varying functions performed by agencies.
- Designation of a single clearing house that would coordinate all foreign Federal activities in documentation and dissemination of technical information. (It would receive and pool all such information originating abroad, and would service all requests for foreign publications and translations.)
- Having been advised of the importance of the large number of national and international conferences that have taken place and are scheduled for the future, the Committee recommended establishment of priority guidelines and careful coordination by the clearing house so that overlaps may not occur and the time of participants may not be wasted.
- Continued and increased use of foreign currencies generated by Public Law 480 (Food for Peace) shipments to foreign countries, for the acquisition of foreign scientific and technical information and its translation.
- Since restrictions placed on information by reasons of security are often obviated by passage of time, that frequent review of restrictions be made so that information possibly useful elsewhere need not remain unavailable any longer than is essential to the national interest.
- Finally, the Committee urged that all Congressional committees give special attention to the scientific information activities for the departments and agencies under their jurisdiction.

The Committee poses among important questions to be resolved:

- The need for increased mechanization of information facilities.
- Whether machine translation can be counted on to compensate for the fact that more than 40 percent of the world's scientific literature is written

Two Deputies Assigned to AMC Director of R&D

Two general officers are newly assigned as deputies to Brig Gen W. C. Gribble, Jr., Director of Research and Development for the U.S. Army Materiel Command (AMC). General Frank S. Besson, Jr., AMC CG, announced the organizational change.

Brig Gen Kenneth H. Bayer is Deputy Director of Research and Development (Operations) and Brig Gen Tobias R. Philbin, Jr., is Deputy Director of Research and Development (Plans).

General Bayer is responsible for the current year research, development, test and evaluation (RDTE) program. As such he acts for the director on all matters pertaining to the execution and accomplishment of this program.

An Artillery officer, he has served as Artillery commander, III Corps, Fort Chaffee, Ark., and assistant division commander, 7th U.S. Infantry Division, Korea. He was executive assistant to the Secretary of the Army (1960-62) and prior to that time was chief, Air Defense Division, Office of the Chief of Research and Development, Department of the Army.

GENERAL PHILBIN is responsible for the formulation of all plans for future year RDTE programs. He supervises the preparation of the 5-year RDTE budget program and research and development portions of command plans and estimates. This includes mobilization plans and the long-range technical planning, forecasting and concept analysis of matters relating to the Army combat developments program.

As commander of the 1st Battalion, 379th Infantry, during World War II, he was awarded the Distinguished Service Cross for heroism. He also received the highest combat decoration Great Britain can award a foreigner, the Distinguished Service Order. He is a holder of the Silver Star, two Bronze Stars, two Purple Hearts, the Army Commendation Pendant with Cluster, and the Combat Infantryman's Badge.

He received an M.A. degree in international relations from Georgetown University in 1955 and during the period 1962-63 was the Army Fellow at the Center for International Affairs at Harvard University, Cambridge, Mass.

Prior to coming to the AMC, he served in Korea as senior adviser, First Republic of Korea Army.

Brig Gen K. H. Bayer

Brig Gen T. R. Philbin

in languages incomprehensible to the majority of U.S. scientists and engineers.

• Whether there should be an insistence on uniformity in hardware—in the data processing equipment produced by different manufacturers.

Appendixes A through H-1 of the Committee's finding cover a summary report on COSATI; state objectives of information programs of the Federal agencies; present the background of Congressional activity in relation to automatic data processing equipment; and provide information on Federal support of scientific and technical publications.

Covered also in the appendixes are studies completed in FY 1964 or now underway in Federal agencies on needs of users of scientific and technical information and methods designed to improve communication of R&D information; a summary of program activity of the Office of Science Information Service (FY 1964, actual and FY 1965, estimated); and a list of contracts and grants awarded by the National Science Foundation during June and July 1964 in support of improved dissemination of scientific and technical information.

The House Select Committee on Government Research ends its report with:

"We can do no better than to conclude this report with the words of President Johnson in a communication to scientists and engineers of the computer industry this summer:

"'It is our intention that technology be used to explore the universe while at the same time expanding the capability to store, record, and disseminate knowledge so acquired.'"

Copies of the Report of the Select Committee on Government Research on *Documentation and Dissemination of Research and Development Results* may be obtained through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The price is 60 cents.

Army Mathematics Research Center Announces Staff for Academic Year 1965

Fifty-one renowned mathematicians, including 15 from foreign lands, have been brought together for the 1964-65 academic year at the U.S. Army's Mathematics Research Center (MRC), Madison, Wis., to consider problems of advanced mathematics in relation to military requirements.

In addition to performing research in applied areas of mathematics at the University of Wisconsin, the MRC furnishes guidance and assistance in mathematics research areas to Army facilities upon request.

The MRC also offers educational opportunities to Army mathematicians and others in the form of orientation lectures, advanced seminars, symposia and extended residences at the Center.

Competence of the MRC to perform a function for which no parallel institution is operational for the Armed Forces is based on a permanent and temporary staff.

Permanent staff members provide the required continuity to the Center's program. Temporary members usually are on leave from other institutions and their primary purpose is to keep interests of the Center current with regards to the newest mathematics trends.

Membership of the MRC staff and their major fields of interest are:

Geraldo S. S. Avila, differential equations, and Djairo G. DeFigueiredo, partial differential equations, U. de Brasila, Brazil; Frederick Bagemihl, applied mathematics, Howard E. Conner, branching processes, Stephen C. Kleene, logic & automata theory, Harvey J. Wertz, electrical engineering, Laurence C. Young, calculus of variations, and Robert E. L. Turner, functional analysis, U. of Wisconsin;

Stephan Bergman, complex variables, part. diff. equas., integral operators, and Dale W. Thoe, functional analysis & differential equations, Stanford U.; Randall E. Cline, matrix theory, and C. L. Dolph, integral equations & plasma theory, U. of Michigan;

Donald Greenspan, numerical solution of differential equations, Thomas N. E. Greville, approx. theory & actuarial mathematics, Bernard Harris, statistics, Herman Karreman, operations research & economics, Rudolph E. Langer, differential equations, Henry B. Mann, statistics & number theory, Vivienne Morley, spectral analysis & noise, Ben Noble, integral equations & numerical analysis, Michael Papadopoulos, applied mathematics, Louis B. Rall, numerical analysis & integral equations, Ben J. Rosen, non-linear programing, Barkley J. Rosser, logic & numerical analysis, and Calvin H. Wilcox, differential equations & wave motion, MRC;

Stanley P. Gudder, functional analysis, spectral theory & probability theory, U. of Illinois; Wolfgang Hahn, differential equations, Johannes Weissinger, applied mathematics, and Peter Werner, partial differential equations & acoustics, Institute for Angewandte Math, Germany; David Russell and Jerome Sather, differential equations, U. of Minnesota.

Padam C. Jain, fluid dynamics, Hindu College; Vadim Komkov, engineering & applied mathematics, U. of Utah; Rampurkar Manohar, fluid dynamics, Punjab Engineering College, India; Bryce J. McLeod, eigenvalues, Wadham College, Oxford, England; Josephine Mitchell, integral operators in several complex variables, and Lowell Schoenfeld, number theory, numerical analysis, special functions, Pennsylvania State U.;

F. M. Ragab, special functions, U. of Cairo, Egypt; Ronald Rehm, stability theory, and Bui An Ton, differential equations, Massachusets Institute of Technology; Peter Rejto, perturbation theory, New York U.; Walter O. Roelcke, automorphic functions, U. of Munster, Germany; Iso J. Schoenberg, approximation theory, U. of Pennsylvania;

Donald G. Watts, statistics, De-Havilland Aircraft, Toronto; Herman Wold, economics & statistics, U. Institute of Statistics, Sweden; Peter Wynn, numerical analysis, Stichting Foundation, Amsterdam; William A. Coppel, stability & asymptotic behaviour, Australian National U.;

Donald A. S. Fraser, statistics, U. of Toronto, Canada; Tosio Kato, perturbation & scattering theory, U. of California; Mitutosi Kawaguti, fluid dynamics, Japanese National Railway; Ramon Moore, numerical analysis, Lockheed Aircraft Corp.

Scientific Calendar

6th Solid Propellant Rocket Conference, sponsored by the American Institute of Aeronautics and Astronautics, Washington, D.C., Feb. 1-3.

20th Reinforced Plastics Division Conference, sponsored by the Society of the Plastics Industry, Chicago, Ill., Feb. 2-4.

6th Winter Convention on Military Electronics, sponsored by IEEE, Los Angeles, Calif., Feb. 3-5.

12th Annual Conference of the Western Spectroscopy Association, Asilomar, Calif., Feb. 4-5.

National Meeting of Petroleum and Refining, sponsored by the American Institute of Chemical Engineers, Houston, Tex., Feb. 7-10.

ASTM Committee Week and Spring Meeting, Cleveland, Ohio, Feb. 8-12.

1965 Electrical Trade Exposition, sponsored by the Electric Institute of Washington and the Electrical Manufacturers Representatives Association, Washington, D.C., Feb. 9-11.

Electrical and Electronic Trade Show, sponsored by the Electrical Representatives Club and the Electronic Representatives Association, Denver, Colo., Feb. 15-17.

American Society for Testing and Materials Committee D-9 Meeting on Electrical Insulating Materials, Washington, D.C., Feb. 15-17.

14th Annual Industrial Ventilation Conference, sponsored by Michigan State University, East Lansing, Mich., Feb. 15-18.

Data Acquisition & Management, sponsored by USAECOM and the Electronic Industries Association, Fort Monmouth, N.J., Feb. 17-18.

International Solid State Circuits, sponsored by IEEE, Philadelphia, Pa., Feb. 17-19.

Western Metal and Tool Exposition and Conference, sponsored by the American Society of Tool and Manufacturing Engineers, Los Angeles, Calif., Feb. 22-26.

Chemical R&D Labs Conduct Extensive Skin Research Program

Recognized by medical scientists as the human body's first line of defense, "body armor," the skin is always under constant research scrutiny at the U.S. Army Chemical Research and Development Laboratories (CRDL) at Edgewood Arsenal, Md.

In seeking new and better methods for protecting and treating personnel who may be endangered by exposure to injurious chemical compounds, the Laboratories are investigating natural reactions to abnormal conditions or stress to broaden understanding of the skin's characteristic defensive and healing processes.

The program encompasses research on compounds for carrying therapeutic drugs through the skin; development of more efficient methods for treating skin diseases; marketing of better salves, linaments, ointments, and cosmetics; and fabrication of new and better protective clothing.

In general, the ultimate objective of the program is to provide adequate answers to three critical questions:

- How can undesirable agents be prevented from entering the body through the skin?
- Conversely, how can the penetration of protective or therapeutic agents be aided or accelerated?
- If the skin has already been in contact with certain harmful types of chemical compounds, what are the most efficient and effective methods for decontamination and treatment?

Before specific answers to these questions can be suggested and evaluated, the investigator must have a thorough knowledge of all basic factors which are in operation when an agent either penetrates or fails to penetrate the skin. These factors include the composition and properties of the skin, the composition and properties of the agent to which the skin is exposed, and the catalytic chemical reactions that occur during exposure.

Understanding the skin itself is one of the fundamental building blocks of the CRDL skin research program. Not only are there important differences between various types of skin, but outside influences often affect skin permeability.

Malnutrition, for example, as well as vitamin deficiencies and the lack of certain essential fatty acids in the diet have an adverse effect on skin permeability. If any of these conditions persist over an extended period of time, many agents that normally would be screened out would be afforded a degree of penetrability.

Physical differences between types of skin may complicate the researcher's job by introducing new factors affecting permeability. One such instance may occur when a chemical compound is found to penetrate a hairy skin more easily than a smooth skin. In this case, there is good reason for the investigator to suspect that the agent may be entering the body through hair follicles.

Basic Toxicology branch chief Frank J. Vocci (right) and technician Hubert L. Snodgrass check spectrophotometer to measure spectrum of skin samples at Army Chemical R&D Labs.

Other physical characteristics which vary the degree of permeability are the number and thickness of skin layers, surface conditions of oiliness or dryness, and the amount of blood being circulated in the skin.

To study and evaluate all of these various factors, the scientist must first obtain skin samples. This process involves only minor discomfort to the donor. First, a piece of tape is applied to the skin surface. When the tape is peeled off, it brings with it an outer layer of skin, leaving exposed a lower layer which is the one primarily responsible for preventing most alien material from entering the body. In getting a sample of this second and more important layer, another piece of tape is applied to the same area and removed in the same manner, bringing with it samples of the layer to be studied.

When a sample has been obtained and structurally analyzed, a number of laboratory techniques are employed to observe how the skin sample is affected by various types of agents. One of the most dependable methods is to add a radioactive element to the penetrating agent. Then, through the use of devices that are sensitive to the radioactivity, the researcher is able to follow both the route and the rate of the agent's penetration.

This particular type of experimental technique is employed at CRDL under the direction of field toxicologist John F. Callahan. It enables the investigator to make a precise determination as to which specific layers of skin inhibit or prevent penetration of any given agent. Such studies are useful in evaluating the efficiency of protective or therapeutic substances which are applied directly to the skin.

Another tool used at CRDL to study skin chemistry is an infrared light beam. This work is the primary responsibility of Basic Toxicology branch chief Frank J. Vocci. The technique has the singular quality of providing a "window" through which the researcher can observe extremely minute changes in skin chemistry induced by such things as temperature changes or chemical reactions.

An interesting advantage of the infrared method is that it may be used safely in studies of living skin. A beam of infrared light through the skin obtains an infrared spectrum in terms of molecular bounce, and transmits this information to an automatic recorder. Essentially, it provides the scientist with a "fingerprint" of the skin's structure.

Once this basic information has been obtained, it is possible to apply an agent to the skin and to use the infrared technique to observe the physical changes which result. This permits the researcher to separate, isolate and evaluate the various components under study.

Many other approaches are used by

Field toxicologist John F. Callahan checks tubes in which skin samples have been exposed to a penetrating agent containing a radioactive element during research at CRDL.

researchers conducting both in-house studies and contracted work. But whatever the method used, the common objective is to develop new compounds and devices for preventing injury and for saving lives. CRDL scientists contributing to these studies include Dr. Millard M. Mershon, Joseph S. Wiles and Milton K. Christensen.

The program involves Laboratories-sponsored studies at research organizations throughout the country as well as intensive work by CRDL scientists and technicians.

Organizations that have been or are currently participating in the program include Massachuetts General Hospital, Lever Brothers Co., the University of Washington, University of Pennsylvania, Western Reserve University, City College of New York, University of Tennessee College of Medicine and the University of Wisconsin.

To insure that no feasible approach is overlooked and to avoid possible duplication of effort, the entire program is coordinated by Dr. Bernard P. McNamara, chief of the CRDL Toxicology Division.

USARO Issues Contract for Desert Research Study

The U.S. Army Research Office recently issued a $250,000 contract to the University of Arizona for an evaluative inventory of research activities and the status of current geographical knowledge on desert environments.

Material developed through the project will be used in the planning and management of future research efforts and programs designed to improve Army capabilities in desert environments.

The recent agreement parallels a previous contract awarded by the Army Research Office to Texas Instruments, Inc., Dallas, Tex., in the amount of $202,760 for a similar research inventory in the humid tropics.

In both cases the contractor will perform the following tasks:

- Determine through comprehensive, critical review of the published literature and through appraisals by outstanding scientific authorities and consultants of international repute the current state of knowledge on the respective environment in each of five topical fields.
- Precisely indicate all significant gaps in current knowledge of the five topical fields, review current research relevant to these gaps and suggest research that will fill remaining gaps and increase knowledge of the desert or humid tropics environment.
- Identify major authorities and principal depositories for information on all elements of the five topical fields.
- Compile an evaluated, annotated bibliography of all published work judged to be of particular significance for Army research and development in the respective environment.
- Compile a directory listing all institutions and individuals primarily engaged in research on the desert or humid tropics.
- Present all of this material in a compendium.

The compendium will be based on open sources of information and will have no security classification.

Both foreign and domestic sources of information will be utilized in preparation of the material. The five topical fields to be considered are:

Physical Features, including surface configurations such as slopes, elevations, landform types and patterns, drainage features of various bodies of water, ground water and such surface materials as soils and rock.

Flora and Fauna, particularly density and distribution.

Weather and Climate, including availability and adequacy of weather and climatic data.

Coastal Zones, including such factors as nearshore bottom conditions, tides and currents, surf, breakers and waves, beaches, nearshore erosion and sedimentation, coastal swamps, marshes and structures.

Regional Types, including studies of all aspects of the environment in combination for limited areas or regions.

In reviewing the status of current knowledge and research on the various topical fields and subordinate elements, emphasis will be placed upon those aspects which have military significance because of their bearing on movement, communications, visibility, concealment, cover, fields of fire, deterioration, durability, storage, construction, food supply, water supply, fuel, disease or other military considerations. Particular attention will be given to studies and research which have direct military application.

Dugway Proving Ground Announces Command Changes

Dugway (Utah) Proving Ground's new commanding officer is Col William W. Stone, previously assigned to the Special Projects Branch, Joint Chiefs of Staff, Washington, D.C.

Col Stone served a tour at Dugway from 1952-55 and attended the Chemical-Biological-Radiological (CBR) Weapons Orientation School at Dugway in 1961.

After receiving his master's degree in meteorology from the California Institute of Technology in 1941, he was commissioned in the Army Air Corps. During the Second World War he served in Panama and the Philippines and after the war at Bikini and Eniwetok.

Among his decorations are the Army Commendation Medal for outstanding service as the senior chemical adviser to the First Republic of Korea Army from August 1960 until August 1961.

He also received a citation for award of the Second Oak Leaf Cluster to the Army Commendation Ribbon for distinguished service while assigned as executive officer to the Director of Army Research, Washington, D.C., from 1956-59. Later he attended the Army War College, Carlisle, Pa.

COL JOSEPH J. FRASER, Jr., also is newly assigned as deputy post commander at Dugway Proving Ground. In 1955 he served as post commander at the U.S. Army Chemical Center, Md. Following graduation from the University of Nebraska with a degree in chemical engineering, he was commissioned in the Army in 1940.

LT COL WILLIAM M. HOME is Dugway's new chief of staff, following service at the Proving Ground as director of Personnel and Administration. Graduated from the University of Washington in 1947, he received a master's degree from the University of California in 1953.

Col William W. Stone

Infantryman Study Directs Priority R&D to Lighter Weight, Expendable Items

Priority research and development effort must be directed toward lighter weight and expendable items of individual clothing and equipment for the combat soldier. Further, the commander and his staff must make a coordinated effort to eliminate nonessential activities that waste the energy of frontline troops.

These are among major conclusions of "A Study to Conserve the Energy of the Combat Infantryman" prepared by the Infantry Agency, assisted by the Infantry Board and the Infantry School. All are at Fort Benning, Ga.

The directive for the study was issued by the Combat Developments Command Combined Arms Group when it was commanded by General Harold K. Johnson before he assumed his present duties as Army Chief of Staff.

Approved recently by the Department of the Army, the findings support an earlier study to reduce the load of the combat soldier generated by Col R. C. Williams, president of the U.S. Army Test and Evaluation Command's Infantry Board.

Inasmuch as the capability of an Infantry soldier to fight is directly related to the load he has to carry, the study concludes that lightweight items rate R&D priority as opposed to an increased degree of protection, durability or functional requirements if compromise become essential.

Referring to General George S. Patton's World War II statement that "no soldier need or should walk until he actually enters battle," the study points out that one of the most obvious methods to conserve energy is to move the soldier as close as possible to his objective by means other than "foot power"—by wheeled or tracked vehicles or via aircraft.

The study then concerns itself with the infantryman after he has dismounted from his transportation and begins operations on foot because at this point energy expenditure becomes greatest. It is during this period especially that the soldier's energy must be conserved if he is to accomplish his assigned mission of destroying the enemy.

The study relates that its findings are equally applicable to members of crew-served weapons squads and other frontline soldiers, whose mission is to provide close and continuing support to the combat infantryman. Examples are artillery forward observer parties, divisional combat engineers, and medical aid men.

Bearing on the cost aspects of producing a lightweight load, the study

(Continued on next page)

HEL Studies Impulse Noise Effects on Human Ears

Scientists at Human Engineering Laboratories (HEL), Aberdeen Proving Ground, Md., are attempting to find out how intense sound, such as combat soldiers experience, affects the human ear.

Findings of a current project in the Supporting Research Laboratory, researchers believe, could ultimately revolutionize the design of weapon systems. Dr. David C. Hodge, a research psychologist, is in charge of this impulse noise study.

Regardless of the source of the impulse noise, Dr. Hodge said, be it howitzer, machinegun or an industrial noise source, there is a critical sound pressure level for the man who fires the gun or runs the equipment.

When such a level is passed, there is risk of temporary or permanent damage to the unprotected ear. A major goal of the research program is to find out what the critical sound level is and how it may change from one soldier to another.

Prevention of temporary as well as permanent damage to hearing is a matter of direct concern to Dr. Hodge. If a soldier must fire his rifle suddenly, scientists seek to know by what amount his hearing will be impaired, if at all, and how much recovery time is required before he can detect the enemy or hear the commands of his squad leader.

This pioneering venture of measuring the effects of impulse noise on human hearing calls on the soldier himself in evaluating the amount of impulse noise his ears can tolerate without ill effects.

Those participating in the testing, while not subjected to any condition more severe than that found in normal Army training, are first certified as physically fit by Medical Corps personnel. Then they receive intensive training in the use of an automatic audiometer, used to measure hearing sensitivity in various frequency ranges, both before and after exposure to noise.

Requirements for the test include an audiometric testing booth—as sound proof as possible—and an M60 machinegun mounted on a rigid test stand. Single blank rounds are fired with a pneumatic cylinder and electrically-controlled air valves for recharging the weapon after each round is fired, together with an electronic timing device to control rate of firing.

Using the machinegun as a noise source, researchers study effects of the number of rounds, rate of firing and sound intensity. For actual tests only one of the soldier's ears is subjected to the sound of gunfire while the other is covered. Hearing tests made before and after the noise exposure are compared and the amount of temporary change in hearing, if any, is then determined.

"The problem of noise," declared Dr. Hodge, "is receiving considerable attention from scientists in many disciplines, and in many research environments including military and industrial research laboratories, university medical centers, and private acoustical laboratories.

"That the problem of noise hazards is recognized as important is evidenced in part by the fact that the Veterans Administration and most states have regulations providing compensation for speech-frequency hearing losses suffered as the result of on-the-job noise exposure.

"Further evidence that the problem is recognized as important is found in the fact that military and civilian scientists are cooperating through the Committee on Hearing, Bioacoustics, and Biomechanics of the National Research Council in attempting to draw up standards which spell out the amount of noise exposure which can be tolerated without risk of permanent damage to hearing."

David Penneman, HEL engineer, takes measurement between subject and M6-machinegun during demonstration of a system he helped design by which hearing tolerance to impulse noise can be reliably determined.

shows that less than eight percent of the total Army strength requires the lighter equipment. Current standard items could continue to be issued to all other soldiers with missions less demanding in terms of close enemy contact.

The need to lighten the load of the foot soldier has been recognized by many armies for more than a century. With technical advancement enhancing future availability of lighter weight items, the study claims that loads required to be habitually carried must be weighed against the physiological cost to the individual in terms of protection derived. Light weight as opposed to increased protection would be the governing factor.

To determine ways and means of conserving the energy of the combat infantryman, the report points out, it must first be understood how it is expended. A nontechnical review in the study reveals that the individual soldier in frontline combat situations expends his energy primarily in three ways: normal living requirements of breathing, moderate activity and body basal metabolism; emotional stress caused by fear, hunger, shock, panic, mental fatigue and loss of sleep; and by physical exertion of marching, running, jumping, throwing, digging and load carrying.

Military studies from the days of the Roman Legion to the present have concluded generally that approximately 40 pounds should be the maximum load to be carried by the soldier under the most trying conditions. Additionally, these studies have shown that the location of the load should be as nearly compatible with the body balance and its natural dynamic center of gravity as possible.

Efforts on the part of the infantry team to ease the problem of energy expenditure due to load carrying is being directed toward the principles of (1) reduction of the weight of the load to or below 40 pounds; (2) proper placement of the load on the body; (3) provisions for a mechanical load carrying device.

The current loads were re-evaluated in the study and resulted in two separate loads—a Fighting Load, habitually carried by the individual soldier, and an Existence Load, carried by organic vehicles. Neither load is rigidly fixed, however, but depends upon the situation facing the commander.

A typical example of the two loads could be: *Fighting Load*—Helmet w/Liner, trousers and jacket (utility), poncho, underwear and socks, boots, rifle w/ammo and magazine, canteen w/cup and cover, belt (M14), first aid pouch and packet, entrenching tool w/carrier, and bayonet w/scabbard. *Existence Load* (1/3 ration)—Gas mask, bed roll, pack, rations, grenades and armor vest.

LOAD CARRYING DEVICES. The study brings out that a desirable solution to the problem of saving the energy of the infantryman would be to provide him or his unit with some type of battlefield carrying device which could be utilized to resupply his needs for ammunition, food, and water as well as to transport individual items for which there would not be an instantaneous requirement.

The suggested device could be man or mechanically powered or a combination thereof. It would be used primarily by infantry, airborne infantry, and air assault rifle companies in limited or general war. It would be especially valuable over snow or mountains and narrow trails encountered in jungle and guerrilla warfare.

CANNED RATIONS. Combat rations are not completely satisfactory for use as a battle meal due to their excessive weight, bulk and awkward configuration, the study states. To meet future tactical concepts, a significant improvement is required to provide an 8-10 ounce concentrated food package which the soldier can carry on his person to satisfy his subsistence needs during periods when feeding of a more elaborate ration is impractical.

PROTECTIVE MASK. The current mask (M17) weighs three pounds with carrier and hood. The study's solution is to develop a small, one-pound, expendable mask that would cover the eyes, nose and mouth only and be held in place with a simple strap. It would be habitually carried for emergency, short-time use only until the M17 mask could be brought forward.

Pharmacologist Began Career as Editorial Specialist

The role of women in Army research at Edgewood Arsenal, Md., is ably portrayed by one who began there 23 years ago as an editorial specialist and who now conducts studies directed toward saving lives of military, industrial and agricultural workers exposed to toxic chemicals.

Miss Anne M. Kunkel, who started work at the Chemical Research and Development Laboratories as a "literature surveyor," later earned a master's degree in pharmacology from the University of Maryland School of Medicine and became a professional pharmacologist.

Currently she is studying the structure and effects of chemical compounds with which workers might come into contact and the use of therapeutics to treat exposure cases.

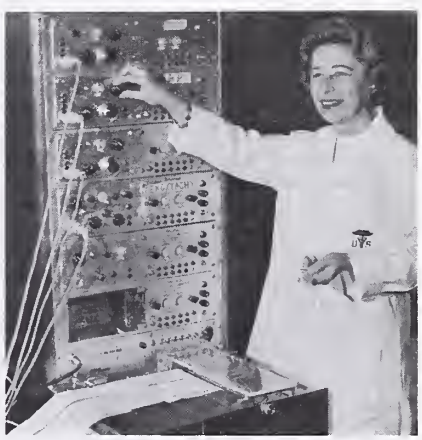
Some of the compounds which have occupied her research in recent years have been products of the missile and space age. They have included rocket and missile propellants and oxidizers and new and exotic fuels for modern air-breathing aircraft engines.

Other compounds have been in existence for some time, but still have unknown or inadequately understood properties. Among these are insecticides, fire extinguishers and cleaners and solvents.

As assistant chief of CRDL's Pharmacology Branch, Miss Kunkel has been one of the scientists chiefly responsible for the development of new information on the action of oximes in treating the effects of compounds of the nerve agent type.

The oximes are a group of chemical compounds ordinarily used in conjunction with atropine and brief artificial respiration. They have proved instrumental in saving the lives of persons who have received several times the fatal dose of a wide variety of compounds which affect the nervous system.

Miss Kunkel is a prolific writer and speaker. In addition to authoring many scientific and technical papers, she has made numerous oral presentations and is affiliated with a number of professional societies, including the American Society of Pharmacology and the Federation of American Societies for Experimental Biology.



Anne M. Kunkel

AMRA Toxic Metal Processing Requires Special Facilities

Because of their toxicity, two modern metals used by the Army for structural purposes, beryllium and uranium, require special equipment and facilities for safe and efficient processing.

The U.S. Army Materials Research Agency (AMRA), Watertown, Mass., among its highly specialized laboratories, has unique facilities for conducting metallurgical research and alloy development of each of these metals.

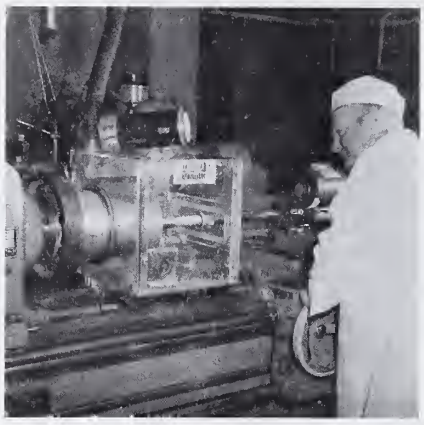
A high-strength, lightweight material, beryllium—used in missiles and other space applications—weighs approximately one-fifth as much as steel (pieces of like dimensions), yet the strength of beryllium is nearly equivalent to that of steel.

Uranium, on the other hand, is a very heavy material, nearly three times as dense as steel. It is of interest as a high-density, workable, structural material, as an alternate to tungsten, which is difficult to fabricate.

The uranium employed in this instance has been depleted of its fissionable isotope, at facilities of the U.S. Atomic Energy Commission, in contrast to that used for nuclear fuels, and is therefore available as a byproduct of the atomic energy program.

The toxicity of each of the metals is such that a separate facility was designed and installed at AMRA to handle the new structural materials.

The beryllium facility is thoroughly ventilated to keep the atmosphere free of beryllium oxide dust, the concentration of which for safety sake must be less than two millionths of a gram per cubic meter of air. Inhalation of beryllium oxide dust is recognized as the principal cause of the lung disease known as berylliosis. The low limit is maintained by means of special equipment and rigid discipline.



SPECIAL ENCLOSURE for machining beryllium, showing connection to high ventilation system, at U.S. Army Materials Research Agency.

For example, machining operations such as lathe turning, milling and grinding are done either in special enclosures or with high-velocity ventilation, as shown in (Figure 1). Other metal processing operations are also carried out in isolation. These include arc button melting; zone melting, done in a sealed quartz chamber that is contained in a fail-safe, water-cooled jacket; and hot pressing, accomplished within an evacuated, sealed chamber, useable up to 4100° F.

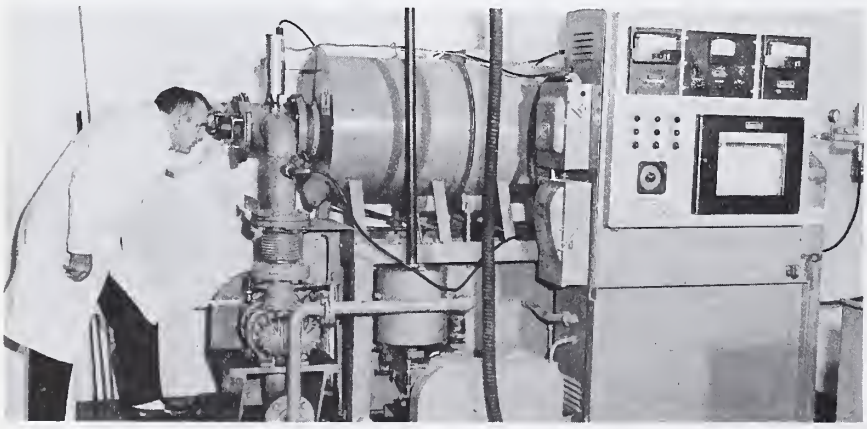
Powders, which present a serious dust problem, are handled in "dry boxes" equipped with glove ports. Operations such as weighing and blending, vibratory compacting, welding, ultrasonic cleaning, and cathodic etching or chemical etching for metallography are also performed within enclosures. All exhaust vents lead to an air-filtering system to insure that air exhausted to the surroundings is uncontaminated.

Uranium used at Watertown is toxic and must be handled to avoid the spread of inhalation of its very heavy dust. Although classified as "depleted," it is mildly radioactive and must be handled with caution.

Machining operations such as lathe turning, milling and grinding are performed with adequate ventilation so that all chips and dust are exhausted to a central collector. Operators wear shoe covers that are discarded on exit to insure that all traces of radioactive dust are retained within the working areas.

Experimental heat treatment is done under vacuum, as shown in Figure 2, a procedure that is necessary for metallurgical reasons, and which also guards against contaminating the environment. As a final precaution for cleanliness, all personnel, before exit, monitor their hands and feet for radioactivity.

The facility has been in operation for nearly a year for the conduct of metallurgical research and alloy development of each of these metals. In addition, the facility is equipped to fabricate, on an experimental scale, prototypes of special components of Army materiel.



VACUUM HEAT-TREATING equipment used in development of uranium alloys at the U.S. Army Materials Research Agency, Watertown, Mass.

Col Fitzpatrick Assigned CO Of Army Technology Center

The U.S. Army Foreign Science and Technology Center, Washington, D.C., recently welcomed, as its third commander, Col Francis C. Fitzpatrick.

Until departing for his new duties he was assistant chief of staff, G-2, IX U.S. Army Corps, Okinawa. He has served as staff officer, Special Warfare Division, director of Plans, Deputy Chief of Staff for Military Operations, Washington, D.C.; armor liaison officer, Joint Brazil-U.S. Military Commission, Brazil; battalion commander, 63rd Tank Battalion, U.S. Army-Europe; Intelligence staff officer, Military Services Analysis Branch, European Command; company and squadron commander, 4th Calvary, Europe, in World War II.

Col Fitzpatrick graduated from the U.S. Military Academy in 1941 and is a graduate of the Air Command and Staff College, Air University, Maxwell Air Force Base, Ala.

DoD Limits Hiring to Protect RIF Employees' Rights

Restrictions on hiring new Federal Civil Service employees until Feb. 28, to permit personnel of 95 military installations on a closure list to register transfer rights for jobs with other activities, were announced Dec. 2 by Secretary of Defense Robert S. McNamara.

The policy order, issued to the Service Secretaries and agency directors Nov. 20, limits hiring of white collar workers and places a freeze on hiring of new blue collar or Wage Board personnel except for temporary appointments.

After Feb. 28, more selective restrictions are expected to replace the initial general freeze, which, however, does not include internal actions, such as filling vacancies by promotion from within.

Mr. McNamara's memorandum requires maximum effort to fill positions on a permanent basis with employees at bases being closed or with employees scheduled for separation by reductions in force or failure to accompany transferred functions.

Although permanent appointments to positions under the Classification Act (white collar) were not completely discontinued, the memorandum directs that hiring for such positions from other than employees affected by closures, transfers of functions or reductions in force be held to the minimum required for essential operations. Temporary appointments will be made wherever practicable when appointments of new employees are necessary.

The Department of Defense also expects to have a computer program in operation about Feb. 28, which will greatly expedite the effort to provide job opportunities.

Tested on a pilot basis in the 6-state Chicago Civil Service region (Illinois, Indiana, Kentucky, Michigan, Ohio and Wisconsin), the computer program will be adapted for Nation-wide use.

Deputy Secretary of Defense Cyrus R. Vance further directed the Service Secretaries and the Director of the Defense Supply Agency to send headquarters officials to visit the installations announced for closing and explain to employees the program for providing another job opportunity to those affected by base closures.

Secretary Vance also ordered development of detailed phase-out plans and statements of planned placement action.

Approximately 28,500 of the 63,401 positions to be eliminated by 95 base-closing actions, announced by Secretary McNamara November 19, are filled by civilians. More than 135,000 civilians are hired annually in the Department of Defense in the United States.

During Fiscal Year 1964, an estimated 40,000 of these accessions represented movement across Military Department and Agency lines, while approximately 96,000 new employees were hired to fill vacancies in the United States.

ERDL Lets $5 Million Contract For Image Intensifier Production

A $5 million contract for production of image intensifier tubes to be used in night-viewing systems was issued recently by the U.S. Army Engineer Research and Development Laboratories (ERDL), Fort Belvoir, Virginia.

Machlett Laboratories, Inc., Springdale, Conn., contracted to produce night-vision equipment developed by the Belvoir Laboratories. The special tubes intensify the low level of natural night illumination, providing the combat soldier with operational night viewing capability comparable to daylight.

(For complete story on night-vision equipment development, see p. 24 of the December 1964 issue of this publication.)

General Sir Charles Jones, Master General of Ordnance, United Kingdom, one of Great Britain's highest ranking Army officers, recently visited Picatinny Arsenal's Plastics Laboratory. Left to right are: William J. Powers, assistant chief for research in Picatinny's Plastics and Packaging Lab; Col H. H. Wishart, commanding officer; and General Jones, who is responsible for the research, development, procurement and production of weapons, vehicles and equipment for the British Army.

By Ralph G. H. Siu

THE INNER CIRCLE. "I must not omit an important subject," said Machiavelli in *The Prince*, "and mention of a mistake which princes can with difficulty avoid, if they are not very prudent, or if they do not make a good choice. And this is with regard to flatterers, of which courts are full, because men take such pleasure in their own things and deceive themselves about them that they can with difficulty guard against this plague; and by wishing to guard against it they run the risk of being contemptible. Because there is no other way of guarding one's self against flattery than by letting men understand that they will not offend you by speaking the truth; but when everyone can tell you the truth, you lose their respect.

"A prudent prince must therefore take a third course, by choosing for his council wise men, and giving these alone full liberty to speak the truth to him, but only of those things that he asks and of nothing else; but he must ask them about everything and hear their opinion, and afterwards deliberate by himself in his own way, and in these councils and with each of these men comfort himself so that everyone may see that the more freely he speaks, the more he will be acceptable. Beyond these he should listen to no one, go about the matter deliberately, and be determined in his decisions."

* * *

FOLLY SHIELDING. Kind-hearted managers hesitate to point out the errors of subordinates even though such actions may help them considerably. Herbert Spencer (1829-1903) in *State Tamperings with Money Banks*, thinks such practices to be unwise. "The ultimate result of shielding men from the effects of folly," says he, "is to fill the world with fools."

* * *

EXCESSIVE FAITH. It is comforting to have men of conviction around, but the famous French physiologist Claude Bernard (1813-1878) has reminded us that:

Men who have excessive faith in their theories or ideas are not only ill-prepared for making discoveries; they also make poor observations.

Scorpion Scare Could Have Been Serious . . .

USARJ Medical Lab Belies Red Propaganda Claim

When Scorpions being shipped to the U.S. Army 406th Medical Laboratory, Camp Zama, Japan, escaped in Tokyo International Airport, Russian propaganda was quick to claim the scorpions were a U.S. secret weapon.

The incident might have spelled trouble for U.S. Army personnel, but officials at the 406th Medical Laboratory turned it into an opportunity to tell the world about their research work and the people it benefits.

About 500 scorpions had been air shipped from India by an animal dealer to Lt Col Hugh L. Keegan, a medical research officer seeking to develop an anti-venom effective against scorpion stings anywhere in the world. He has been working with scorpions and snakes in anti-venom research for four years.

It was nearly 4 a.m. when the telephone rang and an excited Japanese voice told Col Keegan that scorpions addressed to him had escaped from their crate in the airport.

When he arrived at the airport he learned that only 12 of the puniest of the scorpions, an 8-legged relative of the spider, had escaped through a small hole in the wooden shipping container. He rushed one scorpion to his laboratory and tested it on a mouse to determine the potency of its poison. The mouse merely shook itself a couple of times and continued sniffing for food.

That eliminated the danger at the airport while local police eliminated the scorpions with clubs and shoes. Col Keegan took the rest of the scorpions back to his laboratory.

The Japanese newspapers that day carried stories of the incident. A few days later, Radio Moscow and other Russian news media were booming to the world that the scorpions were a new U.S. biological weapon which would be used against Communist guerrillas in Viet Nam. Red propaganda claimed that the 406th Medical Laboratory was a secluded and secret biological warfare facility.

Col Robert H. Holmes, U.S. Army Medical Commander in Japan, denied the Russian charge and said that the Medical Laboratory had nothing to do with biological, bacteriological or radiological warfare.

The laboratory is so safe that thousands of children and adults visit the facility annually, he explained. To prove it, he invited the Japanese and foreign newsmen to tour the facility, where they learned about the anti-venom research and other medical studies.

The 406th Medical Laboratory was established in 1946 during the U.S. Military Occupation of Japan. After the occupation ended, it was retained to take advantage of highly skilled Japanese medical technicians, reputed to be the best-trained in Asia.

The U.S. Laboratory works with major Japanese universities and research groups and the United Nations World Health Organization. It maintains satellite laboratories throughout East Asia, including South Korea, Okinawa, the Philippines and South Viet Nam.

Lt Col Joseph F. Metzger, a pathologist, is the commanding officer of the Laboratory. To Japanese newsmen who accepted the invitation to visit the facility, he explained that personnel study diseases prevalent in Asia and supply information gained from the research to the whole Asian region.

The Laboratory employs 110 Japanese, each an expert in his medical field, and only 34 Americans. Japanese laboratory workers include 12 medical artists, who turn out illustrations for technical publications on laboratory experiments.

Among other projects, the Laboratory continuously checks radioactivity in the atmosphere and studies such Oriental diseases as encephalitis, hepatitis and Korean hemmorrhagic fever. As a result of the scorpions incident, Japanese newsmen effectively told the story of these beneficial research activities to millions of people.

Dr. Carl Lamanna, deputy chief and scientific adviser, Life Sciences Division, U.S. Army Research Office, Washington, D.C., confers with Maj Gen Chester W. Clark, CG, U.S. Army Japan, during recent tour of Far East research facilities. In addition to his Camp Zama visit with the former Director of Army Research, Dr. Lamanna conferred with Col Arvey C. Sanders, CO, U.S. Army R&D Group, Far East, and visited various universities and institutes, the U.S. Army Medical Command, 406th Medical Laboratory, Army Attache, and Medical Director, Technical Research Institute, Japan Defense Forces.

Hoopes Named Deputy ASD For Near East, South Asia

A post-war 26-year-old special assistant to the first Secretary of Defense, James Forrestal, in 1948, was appointed Dec. 2 as a Deputy Assistant Secretary of Defense in the Office of the ASD (International Security Affairs).

Townsend W. Hoopes, who served five years under Forrestal, is backed by a distinguished career for his new duties as Deputy ASD for Near East, South Asia Affairs and Military Assistance Program Policy Review. Since 1958 he has been a partner in the New York management consultant firm of Cresap, McCormack and Page.

A native of Duluth, he joins the ranks of numerous Minnesotans appointed to high positions in Government during the past four years. He entered Federal service in 1947 as legislative assistant to the Chairman of the Committee on Armed Services, House of Representatives.

Mr. Hoopes joined the Office of the Secretary of Defense in 1948 at the request of Mr. Forrestal. In 1949 he was appointed secretary of the Armed Forces Policy Council and from 1951-53 was an assistant for National Security Affairs.

After leaving the Government, he served as consultant to the White House on organization of the National Security Council in 1954. In 1957 he was a consultant to the Department of State and the Department of Defense on overseas military bases.

A year later he became executive secretary of the private study group which produced the "Rockefeller Report" on national security, under auspices of the Rockefeller Brothers Fund. In 1960 he was consultant to the President's Committee on United States Information Activities Abroad.

As a Marine Corps officer in World War II, he participated in the initial assault and capture of Iwo Jima. He is a graduate of Yale University and the National War College.

AMRA Conducts Priority Research on Refractory-Alloy Sheet Materials

Development and evaluation of refractory-alloy sheet materials is continuing as one of the priority research and development projects at the U.S. Army Research Agency (AMRA), Watertown, Mass.

The project is part of a development program in materials suitable for high-temperature structures which has resulted from increased military emphasis on weapons systems involving missiles and rockets.

Because refractory-alloy sheet is difficult to produce, a full-scale program to study it was initiated by the Materials Advisory Board of the National Academy of Sciences.

The need for an integrated approach to refractory-metal sheet problems led to the establishment of an Advisory Refractory Metals Sheet Rolling Panel, comprised of representatives of producers, users, research organizations and Government agencies.

The Panel effected guidance of the programs and selection of the most promising candidate alloys for evaluation. Final selection was based on the performance of alloy samples when subjected to many kinds of tests at elevated temperatures in various environments.

AMRA was selected by the Sheet Rolling Panel to serve as the qualified and unbiased laboratory to evaluate the products. Evaluation is being conducted by Thomas S. DeSisto and George E. Gazza, with Stuart V. Arnold serving as liaison representative to the Panel.

Examination to date has been completed on five columbium-base alloys, four tantalum-base alloys, three molybdemum-base alloys and one tungsten-base alloy. Tensile and stress-rupture data have been obtained, in a vacuum environment, at elevated temperatures up to 3500° F.

Supplementary bend tests were conducted between room temperature and minus 320° F. to determine bend transition temperatures of base metal and welded specimens. Chemical analysis, with particular emphasis on interstitial content, and microstructural examinations also were made.

As was expected, the major difficulties were associated with maintaining proper temperature control and insuring axiality of stress.

Effects of temperature, chemical composition, and processing variables on the metallurgical characteristics of each material were studied to interpret changes in mechanical behavior. Data derived from the program were shown to have excellent reproducibility with a high degree of accuracy.

Mechanical properties of each alloy were compared with target properties that had been established by the Materials Advisory Board as desirable base lines, but not as minimum prerequisites, for a favorable evaluation.

The general conclusion of researchers is that outstanding progress has been achieved in promoting elevated-temperature strength while maintaining good fabrication qualities. A typical target for tantalum-base alloys was an elevated-temperature strength greater than 35,000 p.s.i. at 2400° F. and 25,000 p.s.i. at 3000° F., while maintaining the capability to be bent 90° at minus 320° F. without cracking.

The properties aimed at for the columbium-base alloys were somewhat lower. Both high-temperature strength and low-temperature ductility are desired so that the alloys may be capable of being more easily fabricated. Alloys possessing higher strengths at elevated temperatures are also being developed, with less effort on low-temperature ductility.

Brooklyn Polytechnic Sets System Theory Symposium

A "Symposium on System Theory," the 15th in Brooklyn Polytechnic Institute's series of annual international symposia, will be held in New York City, Apr. 20-22, 1965.

The symposium is being organized under the aegis of the Microwave Research Institute of the Polytechnic Institute of Brooklyn. Cosponsors are the U.S. Army Research Office, Air Force Office of Scientific Research and Office of Naval Research, with the cooperation of the Institute of Electrical and Electronics Engineers and the Society for Industrial and Applied Mathematics.

Designed as a review of the present status of system theory and a forum for discussion by engineers, physicists and mathematicians, the symposium is being centered around invited papers. Contributed papers may be submitted until Jan. 15.

Topics to be considered include basic notions of system theory; mathematical representations of systems; dynamic systems, including finite-state machines; systems with random inputs; optimal systems; systems identification; large-scale systems; the relation of system theory to science and engineering.

Correspondence may be addressed to: Symposium Committee, Polytechnic Institute of Brooklyn, 333 Jay St., Brooklyn, N.Y. 11201.

E-Command Physicist Honored by IEEE Board

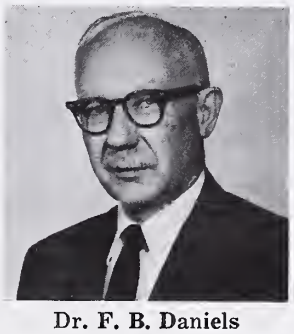
In recognition of his radio wave propagation research involving use of moon-reflected radar signals, Dr. Fred B. Daniels is a new Fellow in the Institute of Electrical and Electronics Engineers, effective Jan. 1.

Dr. Daniels is a physicist in the Institute for Exploratory Research, U.S. Army Electronics Command Laboratories, Fort Monmouth, N.J. The honor was voted by the IEEE Board of Directors and the citation was signed by Clarence H. Linder, IEEE president.

Dr. Daniels was acclaimed "for pioneer work on radar signals reflected from the moon and contributions to radio communications."

The Army physicist uses the E-Command Laboratories' Diana radar to obtain data on reflections from the moon. One purpose of the studies is to obtain more information on the electron content of the ionosphere.

Findings are expected to be of great value for improving radio communications which depend on reflecting signals off the ionosphere, or in the case of radio transceivers which operate within or beyond the earth's ionized sheath, for communication with satellites and manned spacecraft.



Dr. F. B. Daniels

Dr. Daniels holds a Meritorious Civilian Service Award, given by the Department of the Army along with a $1,000 cash payment for his research in other fields. He has been granted several patents and has had some 25 of his papers on various topics published in leading scientific journals in the U.S. and other countries.

Employed at the Fort Monmouth Laboratories since 1940, he has B.A. (1933) and M.A. (1934) degrees from the University of Nebraska and a Ph. D. from the University of Texas (1938).

He is a member of Phi Beta Kappa, Sigma Xi, and Pi Mu Epsilon, the American Geophysical Union, the International Scientific Radio Union and the Acoustical Society of America.

Kudos

A cash award of $1,010, recorded as the highest ever received by an employee of the U.S. Army Missile Command, Redstone Arsenal, Ala., was presented recently to Lloyd L. Jenkins, an equipment specialist in the Directorate of Supply and Maintenance.

His idea for improving the shipping containers for ENTAC missiles saved the Government $71,429. Thirteen other employees divided $1,690 in suggestion awards. Maj Gen John G. Zierdt, CG of the Missile Command, who made the presentations, stated that in the past 10 years Redstone employees have shared in awards totaling more than $100,000 for suggestions which have saved the Army millions of dollars.

Meritorious Civilian Service Awards, the second highest honor accorded Army civilian employees, were presented to Horace R. Lowers, Missile Command chief engineer; Robert C. Lowry, director of programs; and Kenneth A. Joy, director of the Quality and Reliability Management Office.

The Missile Command's Directorate of Procurement and Production, with 1,300 employees, received the Command's suggestion award plaque for the most suggestions during the quarter.

A research and development employee at the U.S. Army Mobility Command in Warren, Mich., was honored by the Department of Defense for development of a system which will result in better utilization of $250 million in Government funds.

Merritt D. Elliott, a Civil Service employee for more than 25 years and a long-range planner for the Mobility Command's R&D Directorate, was presented with a citation and a check for $500 by Maj Gen Alden K. Sibley, Mobility Command CG.

The citation reads: "Mr. Elliott served as chairman of a task force of 20 men, nominated by several commands, organized to formulate the methodolgy of long-range technical planning for uniform adoption by the entire U.S. Army Materiel Command complex.

"The procedures developed and adopted will result in better utilization of approximately $250,000,000 of the Army's research, development, testing and evaluation funds in the research and exploratory development categories.

"Qualitative improvements will result in the area of improved technical responsiveness to combat development objectives; in the timeliness with which decisions are reached, on the adequacy of technology to support the combat development objectives and in the virtual elimination of false starts on costly materiel development programs unless the need is so great as to justify the expenditure."

1964 NOBEL PRIZE WINNER in physics, Dr. Charles H. Townes (left), provost, Massachusetts Institute of Technology, is congratulated by Maj Gen Frank W. Moorman, CG, U.S. Army Electronics Command, during the general's visit to MIT to give a briefing on Army R&D.

Director of Army Research Brig Gen Walter E. Lotz, Jr., presented Certificates of Achievement Dec. 16 to Peppino N. Vlannes and Dr. Selig Starr, along with 17 awards for sustained superior or outstanding work performance and two 20-year service pins.

As Deputy Director of Army Technical Information, Mr. Vlannes was cited for exceptional organizational ability in developing the framework of the Army scientific and technical information program——"a tremendous performance which has won him the praise of the Army Director of Research and the Director of Defense Technical Information."

Dr. Starr also was recognized for his contributions to the Army scientific and technical information program, particularly as a member of the Army Information and Data Systems Working Group, and for fostering a program in translation of foreign languages by computers, as well as for initiating Army-wide conferences on computer utilization.

Cited for Outstanding Performance and Sustained Superior Performance were Mrs. Grace K. Smedegard, Scientific and Technical Information Division, and Lawrence E. Jones, of the Adjutant's Office, U.S. Army Research Office.

Dr. Richard A. Weiss, Deputy and Scientific Director of Army Research, along with Mr. Vlannes and Dr. Starr, headed the list of recipients of Outstanding Performance awards. The list included: Roy D. Greene, Mrs. Dorothy R. Ferguson, James E. Williams, Miss Donna L. Ricks, Dr. Hoyt Lemons, Jacob L. Barber, Mrs. Vera B. Brown, Dr. Guy N. Parmenter, Mrs. Frances L. Whedon and Mrs. Irene A. Dunn. Mrs. Lela A. DeTemple received a Sustained Superior Performance award. Dr. Lynn E. Baker and Mrs. June J. Kirk were presented 20-year service pins.

Col Louis W. Pflanz, Jr., now Signals Division chief of the Combined Military Planning Staff, Central Treaty Organization, was recently awarded the Joint Service Medal.

The presentation was made in Ankara, Turkey, by Maj Gen S. E. Gee, Chief of Staff of CENTO'S Combined Military Planning Staff. Witnessing the ceremony were Mrs. Pflantz and Army, Navy and Air Force officers from the U.S., United Kingdom, Iran, Pakistan and Turkey.

The citation covered the colonel's previous assignment as director of the Research Division, Defense Atomic Support Agency Field Command at Sandia Base, Albuquerque,

NIKE-X MISSILE defense system deputy project manager Col Robert H. Bull (left) receives Oak Leaf Cluster to Army Commendation Medal for his "noteworthy improvements and original contributions" while serving as CO of the Birmingham (Ala.) Procurement District from April 1963 to July 1964. Presenting the medal for General Frank S. Besson, CG, Materiel Command, is Col I. O. Drewry, Nike-X project manager.

N. Mex., and praised his skillful direction of a diversified program.

SFC Marvin D. Stone, of the Nike X Engineering Service Test Operation, White Sands Missile Range, N. Mex., was selected as Soldier of the Year by the Headquarters of the Army Air Defense Command, Fort Bliss, Tex.

This marks the third year in a row that a noncommissioned officer of the Nike test group has been selected for this award. Taken into consideration are the soldier's contribution to his unit's mission, knowledge of his duties, military subjects and current events, military bearing and appearance and his military record. Also considered are distinctive achievements of a military nature and the soldier's participation in military-civilian community relations.

Lt Col Phillip Kaufman was officially recognized for making vital and lasting contributions to the research and development effort of the U.S. Army when he was presented the Army Commendation Medal by Maj Gen Lloyd E. Fellenz, director of Chemical - Biological - Radiological and Nuclear Operations, Assistant Chief of Staff for Force Development.

Presently assigned to the Nuclear Weapons Systems Surety Group, Fort Belvoir, Va., a Class II activity of ACSFOR, Lt Col Kaufman was cited for his service in the preparation, presentation and justification of Qualitative Materiel Requirements in the Office of the Chief of R&D.

A civilian employee who has operated Army vehicles 14 years without an accident was one of eight drivers at the U.S. Army Engineer Research and Development Laboratories (USAERDL), Fort Belvoir, Va., presented National Safety Council safe-driving awards.

Recipient of the 14-year safe driving pin was Frizelle O. Givens. Much of his driving is long distance, hauling Army equipment, exhibits and displays cross-country to other Army bases and cities. During the past year, he logged about 10,000 miles.

Mrs. Edna T. Payne, a travel clerk at USAERDL received a $100 Sustained Superior Performance award, an Outstanding Performance rating, and a $35 suggestion award.

Mrs. Marie W. Everett, a secretary in the Executive Office, received an Outstanding rating and Quality Salary Increase. Howard W. Lawrence, an electronics equipment maker in the Mechanical Equipment Branch, received an Outstanding rating and a $100 Sustained Superior Performance award.

ATAC Develops Welding Process for Thick Aluminum

Difficult - to - weld heavy - thickness 7075-T651 aluminum can be welded at room temperature without preheating by using a new process developed by the U.S. Army Tank-Automotive Center, Detroit, Mich.

The Center is heralding the process as an important breakthrough in joining aluminum alloys of heavy thickness without preheating. The technique was reported in November at a Symposium on Lightweight Armor Materials at Detroit.

Shown at the meeting was an H-plate test specimen fabricated by welding ¼-inch 7075-T651 aluminum plate. The welds were of good appearance and had a consistent width of about one inch.

Project engineer B. A. Schevo said the welding was performed on plates which had been saw-cut to a square edge and butted together. A fully automated inert-gas-shielded metal arc consumable electrode machine was used for the joining operations.

The filler wire was 1/16 inch diameter, 4043 aluminum, shielded by argon flowing at 60 c.f.h. and deposited at 11 i.p.m. The 1¼-inch-thick plate was full-penetration welded in two passes, one on each side.

A welding current of 420 amps. and 30-arc volts dug deep into the plate just beyond the center. The pass on the back side penetrated to meet the first pass. All tack welding was started on the base plate and ended on run-off tabs. The joints proper were started and ended on run-off tabs where possible.

Three H-plate specimens have been welded and all were radiographically acceptable. The only defect present was scattered porosity. Several 1¼-inch-thick corner joint specimens have also been welded.

Both 4043 and 5356 filler wire were used to weld 7076-T6 and 7178-T6 base metal. This time the filler wire was 3/32-inch diameter, and the joints were of the partial penetration type, that is, ⅜-inch fillets were deposited on each side of rebated and miter joints.

Two rebated specimens, one of 7075-T6 and one of 7178-T6, were welded with 4043 filler wire. Alloy 5356 filler wire was used to weld one 7075-T6 rebated and one 7075-T6 miter, corner joint specimen. Gas shielding was argon as before, but the current was dropped to 340 amps. and 27 arc volts.

The technique used for welding the H-plate most likely will work for corner joints. This will be the next step in the current investigation.

There are many areas of aluminum welding that need exploration such as joint design, filler wire size, amperage and voltage combinations and even power sources. At ATAC, development goes on for devising methods for joining the strongest lightest-weight materials so that the mobility of our fighting men can be increased.

Natick Scientist Studies Abroad on SA Fellowship

Dr. Elwyn T. Reese, internationally known microbiologist from the U.S. Army Materiel Command's Natick (Mass.) Laboratories, has started a year of study abroad under a Secretary of the Army Research and Study Fellowship.

In his research, dealing mainly with microbial enzymes and new procedures being applied to enzymic hydrolysis of natural polymers, he will study at laboratories in Japan, India, Israel, Spain and London.

As principal scientist of the Natick Laboratories' Pioneering Research Division since 1958, Dr. Reese is credited with conceiving, planning and carrying out long-range investigations involving highly creative research to develop new microbiological principles, methods and fundamental background information.

Recognized for his many significant contributions to the knowledge of enzymatic mechanisms involved in the breakdown of cellulose and related materials, he has authored or coauthored more than 50 technical publications which have had widespread acceptance.

One of his more significant contributions has been the postulation of a mechanism of breakdown of cellulose by a sequence of several enzymes. For many years the first step in this process has eluded investigators. His work has raised hopes for a breakthrough in this area within the near future.

Dr. Reese has been employed by the Army since 1948 and was the research microbiologist in charge of the Mycology Laboratory at the Philadelphia Quartermaster Depot until the installation was moved to Natick and subsequently named Headquarters, Quartermaster Research and Engineering Command in 1958.

Holder of B.S., M.S., and Ph. D. degrees from Pennsylvania State University, he was employed as a teacher of science and biology in the Scranton (Pa.) School District (1934-39), and as a mycologist with industries in New York and New Jersey (1941-48).

U.S. Troops Prepare for Service Testing of Redeye

U.S. Army and Marine Corps troops at the Army Air Defense Board, Fort Bliss, Tex., recently learned how easy it is to pack and fire the world's smallest guided missile—Redeye.

In a joint 3-week familiarization training period, they discovered that the 30-pound missile in its fiberglas launcher can be slung over the shoulder like a rifle. It can be fired from the shoulder by one man without squatting, stooping, loading or assembling anything.

Redeye is designed as frontline defense against low-flying enemy aircraft. The men were trained in preparation for conducting Redeye engineer-service tests by the Air Defense Board, an element of the Army's Test and Evaluation Command.

Trainees came from the Air Defense Board and First Guided Missile Brigade, Fort Bliss, the Artillery Board, Fort Sill, Okla., and the Marine Corps.

The men were trained to handle and operate Redeye rapidly and effectively in combat situations. This necessitated knowing not only the fundamental mechanics and capabilities of the weapon system, but also aircraft identification—U.S. and foreign —their capabilities and performance characteristics.

About 44 hours of advanced training in the field with the missile included intercept decisions and the application of theory learned in 38 hours of instruction during the previous week. Trainees developed a "feel" of the missile launcher from handling and operating it.

REDEYE MISSILE TRAINING — Master Gunnery Sergeant Edward L. Dawson, Marine Corps, and Hall Brown, General Dynamics Pomona, demonstrate Army's Redeye missile electronic trainer for enlisted men in the Air Defense Board's familiarization training course, Fort Bliss, Tex.

Actual missiles were not used. Instead, the men sighted, tracked and fired a simulated weapon, an electronic trainer, and a lead-launch simulator, which is a Redeye airframe equipped with camera and automatic tracker.

Cameras mounted on the airframes recorded on film for each individual as he acquired and tracked the target on live runs made by helicopter, conventional aircraft and single engine jets at varied trajectories. Developed film from each exercise was reviewed the following day and critiqued for individual errors, strong and weak points.

The men were prepared for joint Army-Marine Corps engineer-service tests to be conducted on the Fort Bliss range. Since the Redeye system is a joint development of the two services, both will participate in the testing program and both will issue Redeye to combat units as the system becomes operational.

A general concept for utilization of Redeye in combat is to assign 2-man teams to company-sized units within a forward battle area. The overlapping field of fire from adjoining firing teams will increase the kill-capability over the "one missile against one aircraft" concept.

The Army initiated the Redeye program with General Dynamics Pomona in 1959. Research and development tests were conducted at China Lake, Calif. In preliminary firings, the 2-stage, solid-fueled Redeye has successfully intercepted a variety of drone aircraft.

DoD Presents Public Service Medal to ASD Morris

The Department of Defense Distinguished Public Service Medal was presented Dec. 11 to retiring Assistant Secretary of Defense (Installations and Logistics) Thomas D. Morris by Secretary of Defense Robert S. McNamara.

Mr. Morris will return to his management consultant firm. The citation for the Defense Department's highest civilian award, signed by Secretary McNamara, recognized his services from Jan. 20, 1961. It stated:

"During the period of unprecedented developments in military weaponry, he has made unexcelled and lasting contributions to the efficient and effective logistical support of our Armed Forces. He has developed imaginative and effective solutions to management problems in many areas of the Defense establishment.

"Among his achievements are: expanded automation of supply systems and consolidation of supply facilities; increased competitive opportunities for industries participating in defense, with a larger share of procurement going to small business; new incentives to more efficient and economical performance by contractors.

"He has notably improved policies and procedures of procurement; introduced modern methods of industrial management control; improved coordination of military construction programs, with particular emphasis on the provision of more and better housing for military families; improved Defense Department utilization of its real property; developed a program for economic adjustment assistance to communities adversely affected by changes in the patterns of defense spending.

"Perhaps his greatest achievement is his contribution to the development and implementation of the Department of Defense Cost Reduction Program, which has become a vital tool in the management of Defense resources and a model for administrators everywhere."

Edgewood Scientist Briefs Nation's Aerodynamicists

Seventy-five of the Nation's top aerodynamicists and mathematicians listened to Abraham Flatau, chief of the Physics Branch, Army Chemical R&D Laboratories at Edgewood, Md., give a recent presentation on "Magnus Effect Bombs."

Mr. Flatau spoke as a student-lecturer at an intensive week-long course conducted at the Naval Weapons Laboratory, Dahlgren, Va. Director of the course was Dr. John D. Nicolaides, head of the Department of Aerospace Engineering at the University of Notre Dame.

Mr. Flatau graduated from the Purdue University in 1947 and holds three master's degrees: aeronautical engineering, New York University, 1948; engineering, Harvard University, 1950; and in liberal arts, Columbia Universtiy, 1951. He has served on the faculties of Pennsylvania State University, Harvard University, and the University of Maryland extension division.

In 1954 he joined the Chemical R&D Labs. He is a member of the American Ordnance Association, Harvard Engineering Society, American Institute of Aeronautics and Astronautics, Scientific Research Society of America and the Army Munitions Command Aeroballistics Committee.

U.S. Army Materials Research Agency Develops Ultrasonic Transducer

By Otto R. Gericke

As the result of recent applications of ultrasonic waves for non-destructive inspection of materials, attention has been focused on development of efficient transducers for converting ultrasonic vibrations into electrical signals and vice versa.

Efforts have been directed mostly toward improvements in the performance of the piezoelectric transducer. Intensive research has led to the discovery of many new piezoelectric substances and, as a result, transducers with a large variety of characteristics are now available.

In spite of these unquestionable advances in transducer technology, the fact remains that the piezoelectric transducer has certain basic limitations that cannot be overcome by further refinement of fabrication techniques.

One drawback is that the piezoelectric transducer always requires intimate mechanical coupling to the surface of the test specimen. Hence, layers of liquid substances such as oil or glycerine have to be interposed between the transducer and specimen to exclude the air which would otherwise block the passage of ultrasonic energy.

A further disadvantage of the piezoelectric transducer is its rather limited frequency response. Optimum performance can be expected only for a narrow frequency range coinciding with the mechanical thickness resonances of the transducer slab (with the exception of even harmonics).

In view of the limitations encountered with piezoelectric transducers, an effort was made by the Applied Physics Branch of the U.S. Army Materials Research Agency (AMRA) to explore the possibility of utilizing other physical phenomena for the conversion of ultrasonic to electrical energy.

As a research physicist working predominantly in the area of ultrasound and infrared testing at the U.S. Army Materials Research Agency, Watertown, Mass., Otto R. Gericke has authored numerous papers. He won an outstanding achievement award at the 1962 U.S. Army Science Conference at West Point for his work on ultrasonic spectroscopy.

Prior to coming to the United States in 1958 as an "Operation Paperclip" scientist, Gericke attended the Universities of Hamburg and Gottingen in Germany and the Universities of Basle and Berne in Switzerland. He received B.S. and M.S. degrees in physics from Gottingen University in 1943 and 1950.

Otto R. Gericke

Since the ultrasonic inspection of metals plays a very important role in nondestructive testing, a device that would operate on an electrical conducting surface was considered. Experiments aiming in Germany[1] and at AMRA[2] had indicated earlier that a metal or graphite point brought into contact with a metal surface and provided with a bias voltage would convert ultrasonic vibrations of the metal surface into electrical signals.

The experimental results obtained with metal or graphite point transducers were rather unreliable, however, and this approach was not pursued further. Instead, a semiconductor point-contact transducer was considered. The theory was that the charge carrier depletion or barrier layer formed at the tip of the semiconductor in the case of reverse d.c. bias would be distorted by the ultrasonic vibration and give rise to an a.c. signal of the same frequency as the ultrasonic wave.

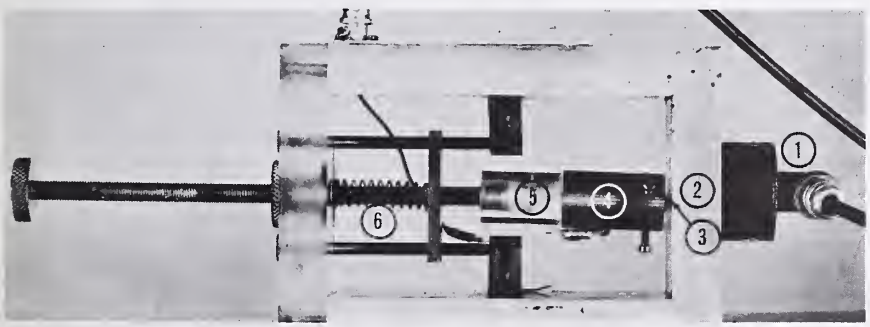
AMRA experiments to investigate the feasibility of the semiconductor point-contact transducer have shown that the predicted effect does indeed exist. Single crystals of "n"-type silicon and germanium provided with sharp points were found to be capable of detecting ultrasonic vibrations on aluminum, copper and steel specimens.

The transducer effect was studied for crystals with various excess electron concentrations, i.e. specific resistivities, and it was found that a value of about 1 ohm-centimeter provides the best results. Germanium was found to be slightly superior to silicon, yielding a signal in the order of millivolts for an ultrasonic excitation of about 0.1 watt per square centimeter.

While the experiments showed that the sensitivity of the semiconductor transducer is considerably less than that of an average piezoelectric probe, it is hoped that the semiconductor devices can be further improved eventually to yield a greater sensitivity.

The advantages of the semiconductor transducer are several. It does not require a coupling medium, and hence can be placed directly onto the test surface, provided the latter is electrically conducting. The sensing area is only of the order of 0.001 per square centimeter and testing on rough surfaces thus poses no problem. No dependence of transducer response on the frequency could be established working in a range of 1 to 5 Mcps.

Researchers expect that the new type of ultrasonic transducer will find various useful applications in nondestructive testing and in determining the mechanical properties of materials by means of ultrasonic waves.



EXPERIMENTAL ARRANGEMENT for studying semiconductor transducer performance. A conventional transducer (1) transmits a pulse of ultrasonic energy through an aluminum plate (2) where it is picked up by the semiconductor crystal (3) mounted in a metal holder (4). A piece of lucite (5) isolates the holder from the spring mechanism (6).

REFERENCES. 1. F. NAUMANN, *Device for the Measurement of Sound at the Surface of Solid Materials,* Deutsches Bundespatent, Application No. 1097721. 2. O. R. GERICKE, *Point-Contact Transducers for Ultrasonic Testing,* Watertown Arsenal Laboratories Technical Report, WAL TR 143.5/1, June 1962.

Newsmagazine Lists Key Articles Published During Past Year

Publication of a complete index of all articles published in the Army Research and Development Newsmagazine during the past year admittedly would be desirable. Space here permits a listing of only the highlight articles.

DEC. 1963-JAN. 1964—Tri-service R&D leaders stress fully coordinated efforts in series of discussions.

Ninety-six selected to give papers at the 1964 biennial Army Science Conference.

Briefing of generals accents AE-R&D Officer Specialist Program benefits.

Army Electronics Command R&D Laboratories, Fort Monmouth, N.J., scientific progress in communications reaches broad area.

Canadian Army R&D effort is directed towards standardization with other signatory countries of the Quadripartite Agreement.

U.S. Army Nuclear Power Program and its impact on tomorrow.

Dr. John Rosser becomes director of the Mathematics Research Center.

Nuclear Powered Energy Depot concept viewed for the modern Army.

XM-15 Escape Capsule Rocket system offers survival hope for jet pilots.

Army Medical Service history of progress touches upon lives of many millions in all parts of the world.

U.S. Army Biological Laboratories, Fort Detrick, Md., activities directed to national defense goals yield byproduct benefits.

Army Natick Laboratories R&D results illustrate broad range of byproducts applied to civilian needs.

Geodesy, Intelligence and Mapping Research and Development Agency contributes to advanced mapping techniques.

The Army orange spectrometer placed in operation in the United States.

Chemical R&D Laboratories encompass a broad range of investigations important to the military and often of vast value in serving civilian needs.

Army Weapons Command centers basic research on goal of stronger, lightweight materials for weapon systems.

Ballistic missiles yield byproduct benefits of Army R&D for the civilian population.

Army Materials Research Agency reveals results of R&D that have served to improve civilian products.

Gigantic computer industry was spawned as a result of the Army's urgent need for ballistic data during World War II.

Waterways Experiment Station serves broad range of civilian as well as Army objectives.

Army R&D has traveled a hard road to achieve unquestioned recognition.

Combat Developments Command shapes Army's future in land warfare spectrum.

Dr. Siu discusses Federal Government's steadily increasing role in and impact on the Nation's R&D effort.

FEBRUARY—*Army-wide scientific and technical information systems are making steady progress.*

ASA (R&D) Hawkins appoints 9-member Army Research Council to deal with problems of Army in-house laboratories.

The Second National Junior Science and Humanities Symposium is scheduled for April.

Cyrus R. Vance becomes Deputy Secretary of Defense—Stephen Ailes sworn in as new Secretary of the Army.

Acceleration of the Army In-House Laboratories Independent Research Program holds $10 million funding level.

Science Adviser to the President gives his views on information problems linked to Government scientific and engineering activities.

Civil Service Commission sponsors new "Ideas and Authors-Science and Government" program.

Army inertial guidance R&D projects from all parts of the Nation will be consolidated at Army Missile Command.

Construction of a Nuclear Pulse Reactor Facility and a Radiation Applications Laboratory to begin this spring at APG.

Army establishes the Korean Human Factors and Operations Research Unit.

Nike X researchers are investigating a computer that performs its logic in much the same way as the human brain.

Army Weapons Command innovates user reaction survey of the M-60 machinegun.

Three Army Missile Command scientists are nominated for the first Goddard Award.

Picatinny Arsenal Human Factors Unit studies the soldier's load-carrying capabilities.

Army Medical Team in Japan works to stamp out dreaded disease caused by snails.

MARCH—Submission of reports by eight Ad Hoc Groups highlights the Army Scientific Advisory Panel.

Chief of Research and Development responsibilities is outlined in a new "Army R&D Treaty Safeguards Program."

Dr. Donald Hornig assumes four titles as the No. 1 leader in Federal science and technology.

Munitions Command emphasizes reliability factors.

President Johnson's challenge to Federal managers.

Action set on Tri-Service coordinated program in Air-Launched Non-Nuclear Ordnance Development.

Picatinny develops hot gas control valve for added thrust in liquid rocket engines.

Paul Ignatius nominated for Under Secretary of the Army.

The Army Research Council is briefed on the research planning process.

Selected Reserve R&D Units are invited to work on long-range scientific and technological forecasts.

OCRD director of Plans and Programs briefs DIAC on Army operational requirements.

Federal Council for Science and Technology approves recommendations to create a central clearinghouse.

Mobile floating assault bridge-ferry undergoes field tests at Fort Knox.

SATCOM Agency unveils the tiny, transportable, satellite communications terminal known as Mark IV (X).

The Select House Committee on Government Research selects a 14-member science-engineering advisory panel.

Bidder's List Control becomes operational at the Army Missile Command.

Working groups report progress on 12 Defense Industry Advisory Council studies.

Army readout station prints out facsimile pictures transmitted from Tiros satellite.

WSMR marks the 15th anniversary of missile tests that verified the key principle of successful space exploration and travel.

Redstone Arsenal's new Scientific Information Center holds opening ceremonies.

Redstone Missile Craftsmen Meet Precise Specifications

Precision requirements in machining many of the parts essential to research experiments call for the highest standards of craftsmanship—for skills that go unrecognized when the honors are passed out—and a prime example is recent work at Redstone Arsenal.

The U.S. Army Missile Command at the Alabama installation had a requirement for a missile part that might have baffled many of the most talented machinists, but not Charles Chaffin and Jimmy Merrell of the Inertial Guidance and Control Laboratory, Directorate of Research and Development.

The task assigned to them was to figure out how to machine slots, acculate to .0002 of an inch, at an angle, both inside and outside the top of a cylindrical piece of metal, coming to a knife edge where the slots met .1875 of an inch from the cylinder's top.

Each slot on the outside had to be identical, as did all slots on the inside. In operation, even a metal burr too small to be seen without magnification could affect the flow of fluid through the slots.

Chaffin said the normal procedure would be to use a slotter, requiring removal of the piece of metal to change angles between the inside and outside slot cuts. This reduced the chances for accuracy and the knife edges tended to curl where the slots met.

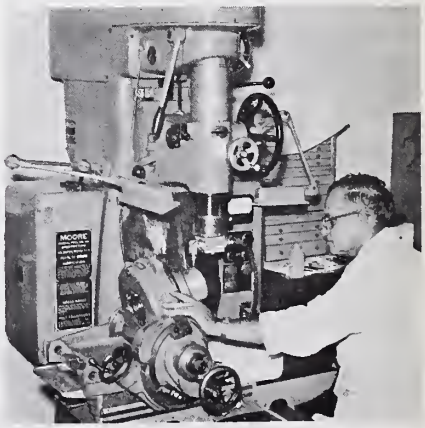
Both conditions affected the hot gas flow during missile tests.

Chaffin and Merrell decided to use an air motor, which runs at extremely high speed without motor heat. The air motor was rigged to a jig boring machine, which made it possible to cut both the inside and outside slots without removing the metal from the machine.

The high speed eliminated the tendency of the metal to curl, and the absence of motor heat eliminated the possibility of thermal movement.

After the machining job was finished, Chaffin said accuracy requirements were met, with .0001 of an inch or so to spare.

The component, or different sized copies, will be tested on the Army's test ranges at Redstone Arsenal. Melvin Crisco, head of the Laboratory's machine shop, said the shop had never been stumped but admitted that occasionally it takes times to figure out a new method.



U.S. Army Missile Command engineering technician Charles Chaffin keeps close tabs on task of machining a component for fluid flow tests in the Inertial Guidance and Control Laboratory at Redstone Arsenal, Ala.

APRIL—*Assurance of participation of* top R&D leaders firms plans for the fourth *biennial Army Science Conference.*

The Department of Defense Council on Technical Data and Information is formed.

Chief of Communications-Electronics displaces the title of Chief Signal Officer as STRATCOM expands.

Brig Gen David Sarnoff discusses computers, communications and defense.

Seven industrial briefings scheduled to inform Defense contractors of long-range plans of the DoD.

More than 60 top leaders in Federal Government, professional societies and industry view the chemical information problem.

Document dissemination transfers from Defense Documentation Center to the Office of Technical Services.

CRD directs intensification of effort to capitalize on the talent in Army R&D Reserve Units.

Daniel M. Luevano becomes the new Assistant Secretary of the Army (I&L).

Army begins testing of the XV-5A Lift Fan Jet/STOL aircraft.

The DoD Military Assistance Program supports and encourages civic action projects throughout the world.

SECOR satellite links geodetic control to worldwide network.

ERDL nominates 13 for the Commanding Officer's Medals for achievement in science, technology and leadership.

Army Missile Command dedicates the Francis J. McMorrow Missile Laboratories.

U.S. Army seeks to control infectious hepatitis in Korea and South Viet Nam by gamma globulin injection.

DoD Directive No. 3200.9 sets Project Definition Phase policy.

USAEPG celebrates 10th anniversary.

Army joins with DoD and NASA in arranging exhibit for New York World's Fair.

MAY—Army regroups structure of the Electronics Command into five new directorates.

Combat Developments Command leaders attend the second annual Commanders Conference.

DDR&E Joint Discussion Forums consider approach to "management by guidance" programs.

Army Weapons Command and its member installations are promoting science in the community.

U.S. Department of State creates the Foreign Area Research Coordination Group.

Project HARP leads to U.S.-Canada study of low-orbital capability for the 16-inch gun emplaced on Barbados.

DoD begins the second phase of PERT cost orientation program.

Infrared Laser radiation destroys certain malignant tumors in mice.

MUST developmental team regards this new concept as an epochal advance.

Army aerial vehicle development is spurred by mobility goals.

Army Weapons Command hosts the third annual Army Operations Research Symposium.

The Air Defense Board service tests gun materiel and air defense systems.

CSC seminars encourage career development of Federal executives.

Results of an Army-supported tropical weather studies published.

U.S. Army Standardization Group-UK furthers objectives of the ABCA Armies and the NATO countries.

JUNE—*Army picks 20 NSF-I winners for summer jobs in laboratories—one girl chosen to attend the Japan Student Science Fair.*

TARC near the climax of the most comprehensive study of Army research problems ever attempted.

Maj Heiden, OCRD, and Miss Vinci, COA, win Pace Awards.

AR 70-31 sets scientific and technical information report standards.

Three presented ERDL commander's annual awards for achievement in science and technology.

On-Site Survey of U.S. Army Scientific and Technical Information Program nears end.

CDC marks second anniversary as a doctrine and concepts organization.

Army Reserve R&D Units aid Junior Science Fairs throughout U.S.

Twelve Government agencies lay the groundwork for a Federal Meteorological Plan.

Studies seek increased body tolerance to chemicals.

Watertown Arsenal is scheduled for elimination in DoD economy drive.

R&D officer wins the General George C. Marshall Award at C&GSC.

Laser extremely intense "giant" pulses extend Army research horizons.

Irradiated foods prove acceptable by troops in garrison messhall tests.

Army Map Service prepares for astronauts' moon landing.

Army medical personnel study high altitude performance of troops.

Eminent scentists and R&D leaders contribute to the success of the Second National JSH Symposium.

JULY—Twenty authors share major awards at the 1964 Army Science Conference.

1964 Army Research and Development Achievements Awards honor 23 winners.

Brig Gen Stanwix-Hay becomes director of Office of Technical Data and Standardization Policy.

Dr. Donald Hornig acclaims in-house laboratories.

Lt Gen Harold Johnson becomes Army Chief of Staff and Lt Gen Creighton Abrams, Jr., becomes Vice Chief of Staff.

General Frank Besson, Jr., becomes the youngest 4-star leader.

AFIP experiments may give clues to the answers to the problems of transplanting human organs.

Army interest in chemical research encompasses a broad area.

Army Electronics Command announces seven major staff assignments.

HumRRO effects reorganization involving key personnel changes.

DoD Instruction 5010.12 prescribes uniform policies for technical data and information.

Electron microscope viewed as cancer research aid.

ERDL'S mission grows as Mobility Command sets up three major materiel centers.

Army contractor studies military implications of global flight fatigue.

Army XV-8A FLEEP passes flight tests at Yuma Proving Grounds.

AUGUST—*Army Working Group moves EDIS into a series of important implementing actions.*

Smithsonian Institution gets Score and Courier satellites.

Group reviews the Federal scientific fellowship programs.

Civil Service Commissioner Andolsek discusses ways to improve your communication.

Army recruiters rate well with industry in search for professional scientific and engineering talent.

Top-ranking Army leaders tour Greenland and Alaska R&D facilities.

High-level representatives of DoD meet at CRDL to discuss CIDS.

White Sands Missile Range celebrates its 19th anniversary.

GIMRADA employees win special study fellowships through national competition.

Hovering, STOL aircraft play strong role in Army mobility.

CSC announces series of career development seminars.

White Sands Missile Range tests Multi-Function Array Radar.

Mathematics Research Center offers various mathematics study plans.

FEA tests simulated methods of testing unitized modular container loads.

Scientists discuss the biological effects and future application of lasers.

Random Access Computer advances CCIS-70 concept.

AMC personnel cited for contributing to the DoD Cost Reduction program.

SEPTEMBER—DoD and NASA agree on research and technology information policy.

Twenty-two Information Analysis Centers have been assigned by DoD.

The Army Research Council releases the proposed "Army Research Program Covering 6.11 Activities for Fiscal Years 1965-1969."

USATECOM is unique in that its sole mission is the testing of materiel.

Army Concept Team in Viet Nam evaluates counterinsurgency operations.

Fluorocarbon polymers fill many Army and industry needs.

NSAECOM realignment major concepts of better balance between planning and operations is being accomplished.

OTS translation program yields Soviet technical information.

Army cuts costs by $837 million during FY 1964.

One year pilot test to evaluate the DoD Engineering Data Retrieval System Plan.

Army scientists continue polar research in Greenland.

The Army's Medical Unit Self-Contained Transportable passes Eglin AFB environmental tests.

Army studies phenomena associated with ultrasound image converters.

Springfield Armory researches weaponry performance of a system of springs under dynamic operating conditions.

Springfield Armory reduces fire hazard by devising bullet traps lined with scrap links.

Tri-Service Project BEARS helps to curb fuel contamination.

Top military and civilian R&D leaders meet at Natick for the second annual laboratory Commanders and Technical Directors Conference.

OCTOBER—*Summary report on an in-depth, on-site survey lists extent of the Army scientific and technical information effort.*

Five of seven citations at the 8th Annual SA Awards Ceremony commended achievements of R&D personnel.

Progress reports on priority R&D areas featured at the ASAP quarterly meeting.

Camp Century's PM-2A portable nuclear power plant returns to the U.S.

ASAP Ad Hoc Groups study R&D problem areas.

Army prescribes interim policies on current and projected electric power requirements.

AMC appoints 11 generals to work with 35 contractors engaged in Defense projects.

DoD military psychological research effort delineated to the delegates of the APA.

HDL uses fluid mechanics techniques to power a missile control system.

Advances in irradiated foods technology reviewed by 300 Free World scientists.

Contractor to develop improved multichannel transmission equipment for Army communications.

Ultrasonic probing method advances flaw detection in cannon tubes.

Lt Col Davis discusses lightweight military materiel requirements.

Fort Rucker hosts 10th Annual Army Human Factors Research and Development Conference.

DoD lets contract for seven COIN prototypes.

Quadripartite Group holds Mobile Field Conference on Terrain Evaluation.

The Army Staff Merit Placement and Promotion Program seeks uniform administrative policies.

Army's GOER vehicles undergo troop tests in Germany.

Army R&D Reserve exhibit at AUSA Conference to show support of NSF-I.

NOVEMBER—Realignment of functions within OCRD merges 8 units in four new Divisions.

COSATI issues scientific and technical information progress report.

Army In-House Laboratories Independent Research Program achievements gain FY 65 funding of $11.2 million.

Growth potentialities of the aircraft industry during the next 50 years are considered excellent by ASA (R&D) Hawkins.

Army awards $309 million contract for continued development and testing of the Nike X.

Military theodolites are being manufactured in quantity in the U.S. for the first time.

WRAIR medical researchers study Viet Nam health problems.

AMC awards a $2.72 million contract for exploratory development effort on MAW.

Army, DoD and AEC review the Army Gas-Cooled Reactor Systems Program.

SORO creates a Counterinsurgency Information Analysis Center.

Operations Research Technical Assistance Group reviews the nuclear-powered energy depot system.

Electronics Command awards a $31 million AUTODIN contract.

Meeting outlines objectives of the Army tactical air traffic control development.

Picatinny dedicates the Ramsey Munitions Laboratory.

WSMR studies behavior of missile systems through controlled atomic bursts at the new Nuclear Effects Lab.

HARP records succesful telemetry probes from 100,000 to 350,000 feet.

Army Employees Receive President's Economy Award Plaques

A woman whose suggestion saved $1.5 million and an armament foreman are the Army winners among 30 Federal employees honored Dec. 4 by President Johnson at the 10th annual Government Employees Incentive Awards ceremonies at Constitution Hall, Washington, D.C.

Margaret A. Bouchillon, a commodity officer at Edgewood (Md.) Arsenal, and Dale Barnett, employed at the U.S. Army Artillery and Missile Center, Fort Sill, Okla., were among those who received awards presented by President Johnson. The Economy Achievement plaques bear his signature.

Mrs. Bouchillon made a study of the rate of use of pesticides in the Department of the Army. Based on her findings, she recommended that the supply of these items reserved for mobilization needs could be reduced substantially. Result: Decreased purchases that cut costs $1.5 million.

The citation of Mr. Barnett credited him with demonstrating exceptional initiative and leadership in encouraging employee contributions to economy. From 81 employees, 42 had suggestions adopted, effecting first-year savings estimated at $21,000, with additional potential savings of $30,000.

Winners were selected from more than 150 nominees and were chosen by U.S. Civil Service Commission Chairman John W. Macy, Jr, Budget Director Kermit Gordon and White House Assistant Frederick Holborn.

Selections were made from three types of contributions: Cost-reduction achievements by employees; successful encouragement of employee economy contributions by supervisors; and cost-improvement actions by program management officers.

Twenty of the awards recognized individual achievement and three were for group achievements by teams of 5, 3 and 2 employees.

President Lyndon B. Johnson presents Economy Awards to Margaret A. Bouchillon and Dale Barnet, two Army winners among 30 Federal Government employees honored during recent Incentive Awards ceremonies in Washington, D.C. Winners were selected from 150 nominated for cost reduction ideas.

Huachuca Seeks Cost Reduction Through Work Simplification

The Army Suggestion and the Work Simplification and Management Improvement programs at Fort Huachuca, Ariz., are main avenues of approach in a 9-month cost reduction drive that began Oct. 1, 1964.

The campaign was inaugurated through the Army's Test and Evaluation Command (TECOM), Aberdeen, Md., and the past success of these programs throughout TECOM has prompted increased efforts toward cost reduction.

At Fort Huachuca, Maj Gen Benjamin H. Pochyla, CG, has proclaimed "A Better Product and Service at Reduced Cost" campaign extending through June 30. During FY 1964 civilian members of TECOM submitted suggestions at a rate of 233.8 per 1,000 employees, and the adoption rate was 35 percent.

The new program as outlined by TECOM will emphasize improvement in administration, supply, safety, maintenance of buildings and equipment, inspection, procurement, manufacturing repair and many other fields as well as greater participation.

General Pochyla has indicated special recognition will be granted in the local Supervisory Achievement Award, granted quarterly, to the supervisor or manager whose employees participate most actively in the suggestion effort.

Defense Contractors Plan Cost Reduction Exhibitions

Exhibits dramatizing cost reduction ideas and achievements by Defense contractors will highlight five regional unclassified advanced planning briefings for business, industry and labor in March and April.

Thirteen U.S. companies are planning displays at the meetings, which are being jointly sponsored by the Department of Defense and the National Security Industrial Association. Briefings are scheduled as follows:

Los Angeles, Mar. 3-4; New York City, Mar. 16-17; Chicago, Mar. 31 to Apr. 1; Dallas, Tex., Apr. 14-15; and Washington, D.C., Apr. 28-29.

All of the companies are participants in the Defense Contractor Cost Reduction Program. The exhibits are intended to provide a cross-fertilization of cost-reduction ideas among contractors, to promote cost consciousness and to stimulate additional contributions by personnel in Government and industry.

The Defense Contractor Cost Reduction Program was established by the Department of Defense and industry in response to President Lyndon B. Johnson's request of Dec. 2, 1963, for "an affirmative program of cost reduction in the performance of Defense contracts."

Guidelines for the program were issued May 15, 1963. The guidelines apply to contractors having an annual volume of Defense sales in excess of $5,000,000, exclusive of firm, fixed-price contracts. Certain other contractors specifically designated by the Department of Defense also are included in the program.

A contractor's performance in reducing costs under this program is evaluated by the Department of Defense. The evaluation is used by the Department when making source selections and when determining profit and fee rates on negotiated contracts where cost analyses are obtained.

A National Contractor Cost Reduction Week is being planned to follow the five regional exhibits.